United States Court of Appeals
for the Second Circuit

APPENDIX

77-4005

IN THE UNITED STATES COURT OF APPEALS
FOR THE SECOND CIRCUIT

Nos. 77-4005, 77-4020, 77-4059

INTERNATIONAL BUSINESS MACHINES CORP., et al.,

Petitioners,

v.

FEDERAL COMMUNICATIONS COMMISSION
and UNITED STATES OF AMERICA,

Respondents.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY, et al.,

Intervenors.

B

P/S

On Petitions for Review of an Order
Of the Federal Communications Commission

JOINT APPENDIX

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Volume III

UNITED STATES COURT OF APPEALS
FILED
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SECOND CIRCUIT

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BEFORE THE

Federal Communications Commission

WASHINGTON, D. C. 20554

In the Matter of

American Telephone & Telegraph Company (AT&T))
) Transmittal No. 12449
Revisions to Tariffs FCC Nos. 260 and 267 (Dataspeed 40))

To: The Commission

PETITION FOR LIMITED REVIEW

The Computer and Business Equipment Manufacturers Association (CBEMA), by its attorneys, petitions herein for review of one portion of the Memorandum Opinion and Order by the Chief, Common Carrier Bureau in the above-referenced matter.[1] Pursuant to the requirements of Section 1.115 of the Commission's Rules, the following is stated:

CBEMA is a trade association representing computer and business equipment manufacturers.[2] CBEMA members produce and market computer terminal equipment similar to the Dataspeed 40/4 equipment and with which the Dataspeed 40 was designed to compete. Thus, the terms and conditions under which the Dataspeed 40 equipment may be offered to the public is a matter of prime concern to CBEMA, and CBEMA participated in all phases of the proceedings below.

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[1] Mimeo 61760, released March 3, 1976 (hereinafter cited as "Order").

[2] CBEMA is participating in this matter through its Telecommunications Committee which includes the following members: Addressograph Multigraph Corporation; Burroughs Corporation; Control Data Corporation; Dictaphone Corporation; Digital Equipment Corp.; General Electric Company; Hewlett-Packard Company; Honeywell Information System, Inc.; IBM Corporation; Monroe, The Calculator Company; NCR Corporation; Olivetti Corporation of America; Sanders Associates, Inc.; Sperry/UNIVAC; Tektronix, Inc.; Xerox Corporation; and 3M Company.

Contingent Nature of This Petition

As discussed below, CBEMA supports fully the result reached by the Common Carrier Bureau and the essential rationale relied upon for its rejection of Transmittal No. 12449, the Dataspeed 40 tariff. If the Commission agrees with the Bureau, as we think it should, then this petition may be considered moot. Should the Commission disagree with the Bureau on one or more major points, however, and require further proceedings in this matter, we respectfully request the Commission to order an adequate disposition of the cross-subsidy issues raised by CBEMA below and inadequately treated in paragraph 22 of the Bureau's opinion. For these reasons, this petition could be considered on a contingency basis, to be disposed of following a decision on AT&T's appeal of the Bureau's main conclusion.[1]

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[1] Our expectations of an AT&T appeal from the Bureau's decision come from a reported statement by Richard R. Hough of AT&T in Telecommunications Reports, March 8, 1976, p. 1.

Introduction and Summary

In reviewing the initial material filed with Transmittal No. 12449, it was quickly apparent that several aspects of the filing were unclear, including whether the Dataspeed 40/4 offering conformed to the Commission's policies which would prohibit cross-subsidization of competitive equipment with revenues from monopoly services.[1] CBEMA petitioned the Chief, Common Carrier Bureau to secure certain vital cost and revenue data from the Bell System to clarify these points before the Dataspeed 40/4 tariffs were allowed to go into effect.[2] It was, and is, our position that the kind of information needed to judge cross-subsidy questions is required by Section 61.38 of the Commission's Rules,[3] and further, that this necessary information had not been submitted by the Bell System. We urged rejection of the tariff on this ground.

Paragraph 22 of the Bureau's Order apparently intended to rule that the cost and revenue material submitted by the Bell System satisfied the requirements of Section 61.38,[4] contrary to CBEMA's position.1/ Instead of a clear ruling on the merits of CBEMA's petition, however, the language of the paragraph conveys only the following terse conclusions:

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[1] This general policy against cross-subsidy has been expressed in several contexts such as the Computer Inquiry, infra, Docket No. 18262, infra, and Docket No. 20003, infra.

[2] CBEMA, Petition for Relief, December 15, 1975.

[3] See, Tariffs-Evidence, 25 F.C.C.2d 957 (1970).

[4] Section 61.38:

> (a) Explanation and data supporting changes and/or new tariff offering. The material to be submitted for a tariff change or for a tariff filing which is for a service not previously offered, shall include: (1) An explanation of the changed or new matter, the reasons for the filing, and the basis of ratemaking employed; and (2) economic data and information to support the changed or new matter including....

- -- CBEMA argued that §61.38 had been violated;
- -- the Bell System submitted some "additional material" (unspecified) to support some "statements" (unspecified) in its original filing; and
- -- "the material" (unspecified) is "not violative" of Part 61 (not that it constitutes a full response to Section 61.38).

For the reasons to follow, we submit that paragraph 22 is a wholly inadequate treatment of the CBEMA arguments as a matter of law, and these arguments should be considered outstanding until they are discussed by the agency in an orderly manner and disposed of with a reasoned opinion. As we will show below, paragraph 22 is inconsistent with the rest of the Order, contrary to the weight of the evidence in the Record,2/ and insufficient to meet the most minimal substantive and drafting requirements of the Administrative Procedure Act and judicial precedents.3/ It is this failure of paragraph 22 of the Memorandum Opinion and Order, rather than the result reached by the Bureau or the

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1/ Paragraph 22:
Finally, CBEMA contends that the cost justification submitted is insufficient and violates Section 61.38 of the Rules. Since AT&T has submitted additional material at our request to support statements made in its original filing, we consider the material not violative of Part 61 of our Rules.

2/ Indeed, the letter of William V. Catucci, Counsel for AT&T, to Joseph M. Kittner, March 26, 1976, suggests that no additional cost justification material was submitted by AT&T after its original filing. Mr. Catucci's letter is reproduced in Appendix A.

3/ See, Nader v. FCC, 520 F.2d 182 (D. C. Cir. 1975) and discussion infra.

rationale supporting the result, which has prompted CBEMA to preserve its original objections to the tariff by this petition for review of paragraph 22.

The Bureau's Decision Should be Affirmed

Notwithstanding the inadequate treatment of our cross-subsidy questions, CBEMA supports fully the Bureau Chief's rejection of the Dataspeed 40 tariff and the essential rationale expressed for that action. The Dataspeed 40 equipment admittedly was designed solely for use within a customer's data processing system, rather than for general communications use, as the Bureau found.[1/] In view of the Dataspeed 40's nature as "an integral part of a data processing system," the Bureau Chief held the Commission's _Computer_ _Inquiry_ Rules and policies[2/] both relevant and controlling in this case of data processing system components. _Order_, ¶15, 19. Specifically, the Bureau Chief found that the _Computer_ _Inquiry_ Rules were designed to prevent unfair competition and cross-subsidy of carrier data processing services with monopoly service revenue to the detriment of monopoly ratepayers and the data processing markets. _Ibid_. Applying these principles, the Bureau Chief concluded,

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[1/] _Order_, ¶16, citing AT&T, Synchronous "dataspeed" 40 System Description, BSP 582-200-001, October 30, 1975, p. 3. Other Dataspeed 40 publications in the record also demonstrate its role as a data processing terminal. _See_, _e.g._, Cluster Controller Survey, item 4 on Bureau's list of record documents, February 3, 1976; and item 5, Remote Computer Markes, communications, terminals and applications, Quantum Science. _See_ _also_, Appendix A where the list of documents is produced.

[2/] In the Matter of Regulatory and Policy Problems Presented by the Interdependence of Computers and Communications Services and Facilities, 28 F.C.C.2d 267 (1971). _See_ _also_, §64.702 of the Commission's Rules.

> The Dataspeed 40/4 offering, however, is so tied to its almost exclusive data processing use as clearly to fall within the ambit of the Commission's expressed concerns. It is designed for, and is intended to be marketed in, this competitive market. Yet the costs associated with its design, development and manufacture, as submitted with this tariff filing, are not clearly separable from monopoly and other regulated common carrier activities.

Order, ¶19. In view of the inconsistency of the tariff with the governing policies, the Bureau Chief rejected it as unlawful on its face. Id. at ¶20.

It is CBEMA's view that the Bureau Chief's application of Computer Inquiry policies to this example of data processing equipment can be fully supported by that decision. The Commission recognized in the Computer Inquiry that the data processing fields were growing rapidly and changing constantly.[1/] Indeed the Commission refused to hinder this growth in the case of hybrid services by setting out rigid rules or definitions;[2/] rather, the Commission left the Bureau considerable authority to rule on questions of hybrid services as they arose.[3/] In addition, careful scrutiny was anticipated for the Bell System companies and their future data processing developments:

[1/] 28 F.C.C.2d at 297-98.

[2/] Id. at 278-79.

[3/] Id. at 281.

> We intend to maintain a careful and continuous observation of the activities of the Bell System companies in their use and application of computer technology for both communications and administrative purposes, to the end that such companies shall not offer data processing which is not clearly incidental to communications within the meaning of the Consent Judgment and this policy statement.

28 F.C.C.2d at 305. The Dataspeed 40 tariff thus presented a Bell System tariffed service which raised substantial questions of its data processing applications. At a minimum, the Dataspeed 40 equipment is within guiding principles of the Computer Inquiry -- prevention of cross-subsidy and promotion of fair competition in innovative user services. The Bureau Chief's rejection of the tariff was therefore fully consistent with his authority to rule on questions arising under the Computer Inquiry[1/] and fully consistent with the merits of that decision.

The Questions Raised Below by CBEMA

In its Petition for Relief, CBEMA emphasized that significant questions were raised by Transmittal No. 12449, for whose resolution inadequate information had been supplied. The questions raised by the filing concerned not only its conformance to the Computer Inquiry policies, but also possible

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[1/] Under §0.291 of the Commission's Rules, the Bureau Chief is delegated broad authority to act on applications or requests that fall under "outstanding precedents and guidelines."

conflicts with the 1956 Consent Decree applicable to the Bell System,[1] and the problems of carrier-supplied terminal equipment (of any kind) in competitive equipment markets. These areas had been a cause of concern to the Commission in formal proceedings,[2] CBEMA argued, and in view of the Commission's concerns, the Bureau should have the proper information to review the tariff before it was allowed to go into effect. Further, detailed cost material of the kind necessary to judge cross-subsidies was required under §61.38 of the Commission's Rules, and failure to supply this information was a valid ground for rejection of the tariff.[3]

---

[1] United States v. Western Electric Company, Inc., 13 R.R. 2143 (D.N.J. 1956).

[2] E.g., the Computer Inquiry, 28 F.C.C.2d 267 (1971) and Docket No. 20003, Economic Implications of Customer Interconnection, 46 F.C.C.214 (1974).

[3] §61.69 of the Commission's Rules. §61.69 and §61.38 were adopted in their present form in Tariffs-Evidence, 25 F.C.C. 2d 957 (1970), aff'd in part sub nom. AT&T v. FCC, 503 F.2d 612 (2d Cir. 1974). On reconsideration of its decision, The Commission spoke specifically of the importance of proper information when reviewing competitive tariffs:

> We have found that it is particularly important to obtain the data required by our rules where questions are raised as to whether a new or reduced rate competitive service is being cross-subsidized by other services and whether there is factual support for allegations of anti-competitive impact from such rates. Thus, the value of our rules as a regulatory tool in the public interest far outweigh any supposed detriment to the private interests of carriers who desire to keep such data from their competition.

40 F.C.C.2d 149, 153 (1973) (emphasis added).

To facilitate the Bureau's review, CBEMA suggested a list of detailed questions aimed at discovering the "complete functional data on the operation of the new Dataspeed 40 equipment; the full information and data necessary for a customer to program his computer for operation with a Dataspeed 40; market application plans and projection for the Dataspeed 40, for example, airline reservation, order entry, etc.; full information concerning equipment costs to show whether there is any cross-subsidy involved such as between the various Western Electric equipments manufactured"; the price factors; mark-up elements used within the Bell System; the profit or return expected; any volume discounts planned for the Bell System purchases; and "full information concerning maintenance, including training and the development of specialized expertise, and its cost estimates and allocation." CBEMA Petition for Relief, pp. 12-13.

The Bell System replied to CBEMA's petition by attacking the relief requested, not the merits of CBEMA's position. Specifically, the Bell System did not deny that the Bureau needed the information detailed by CBEMA, and it did not deny that the full, required information in the areas outlined had not been supplied. AT&T Opposition, pp. 18-20.

In its Reply to Opposition, CBEMA elaborated further on the kind of information required under §61.38 and necessary to judge the questions raised by the Dataspeed 40 tariff. In particular, CBEMA presented a thorough analysis of the normal development and marketing process for a new product by the Bell System as a means of showing the numerous categories of information needed by the Bureau and the opportunities for cross-subsidies within the Bell System in the development process. CBEMA's Reply discussed the AT&T and Western Electric development funds, the Bell Telephone Laboratories funding, Teletype Corporation funding, all of which could have been involved in the development of the Dataspeed 40 items; it discussed manufacturing costs and the corresponding need for cost identification in the following areas -- product lines, labor, material and overhead costs, merchandising costs, warranty costs, return on investment to the Bell System manufacturer, price factors, internal sales to the Bell System. Finally, tariffing costs were covered -- identification of advertising, maintenance and repair expenses, market surveys, rates of return by Long Lines, or internal Bell System entities, and other precise information needed. Again, a long "laundry list" of questions was suggested to assist the Bureau in securing the full data from the Bell System. Reply to Opposition, pp. 17-18. The laundry list is included in Appendix B.

In response to CBEMA's questions on cost identification, the Record contains only one item of information in the letter of William V. Catucci to Bureau Chief Hinchman of

February 25, 1976.[1] Instead of dispelling CBEMA's concerns, Mr. Catucci's letter reinforced them, since it disclosed the plans of the Bell System for significant use of various Dataspeed 40 items for internal purposes. In fact, 1700 Dataspeed 40/4 units were forecast for internal use in 1976 alone.[2] The forecasts for future years were not disclosed, but a fair presumption might be that greater numbers of Dataspeed 40/4 items would be used if the initial units were satisfactory. To our knowledge, no other cost or revenue material was submitted by the Bell System.[3]

Despite this paucity of information in the Record, the Bureau's Order declared that "AT&T has submitted additional material" at the Bureau's request and that "the material" was "not violative of Part 61 of our Rules." In view of the serious questions raised by CBEMA and the failure of the Record to support answers to the questions, the Bureau's action in paragraph 22 is insufficient as a matter of law to dispose of CBEMA's petition.

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[1] Mr. Catucci's letter is attached in Appendix A.

[2] Answer No. 8, page 5 of Mr. Catucci's letter.

[3] Mr. Catucci's letter of Joseph M. Kittner of March 26, 1976, confirms our understanding.

Inadequacies of Paragraph 22

The most fundamental reason why paragraph 22 fails its task as a matter of law is the fact that the Bureau relied on CBEMA's position in rejecting the Dataspeed 40 tariff. On the same page with paragraph 22, the Bureau stated,

> "Yet the costs associated with its design, development and manufacture, as submitted with this tariff filing, are not clearly separable from monopoly and other regulated common carrier activities."

Order, ¶19 (emphasis added). Later the Bureau concluded,

> "It clearly was designed for and is intended to be marketed in, this competitive data processing market, and the material submitted does not permit us to determine whether its development costs are subsidized, as the Commission in the *Computer Inquiry* contemplated could occur. Therefore, we conclude that the service offering is inconsistent with both the rule and policies established in the *Computer Inquiry* and is unlawful on its face."

Id. at ¶20 (emphasis added). In logic, the contentions of paragraphs 19, 20 and 22 cannot stand together. If the cost material submitted by AT&T is not sufficient to judge cross-subsidy of competitive services by monopoly service revenues, then *a fortiori* the Rules designed to elicit this information have not been satisfied. To the extent the innovative language of paragraph 22 attempts to rule in this contradictory fashion, the ruling cannot be upheld, because it amounts to arbitrary and capricious action against the clear weight of the evidence.[1]

Further, paragraph 22 fails the elementary test of all agency action, a clear statement of the issues involved and the reasons for the conclusion given.[2] For example, the "additional material" submitted by AT&T is not specified, although the fact of its submission seems to be critical to the Bureau's conclusion that §61.38 has not been violated. Similarly, the additional material was submitted "to support statements", but no disclosure is made of which statements were to be supported or whether in fact the additional material provided adequate explanations or foundations for the "statements" in the original filing. The same failing applies to the conclusory phrase in paragraph 22. That is, "the material," unspecified, was considered "not violative" of Part 61, apparently a ruling on CBEMA's arguments that §61.38 had been violated. The entire paragraph, taken both as a whole and in its inexplicable parts, is a poor attempt to dispose of a major argument in the case. As a party below who has participated in timely fashion and raised material issues of fact and law, CBEMA is entitled under the Administrative Procedure Act to orderly consideration of its arguments and a reasoned disposition of them. We believe that no claim can be made that paragraph 22 satisfied these requirements.

---

[1] The requirement of substantial evidence to support an agency decision is as old as agency law itself. See, ICC v. Louisville & Nashville R.R., 227 U.S. 88, 91-94 (1913): [A] finding without [substantial] evidence is beyond the power of the Commission."

[2] The Administrative Procedure Act, 5 U.S.C. §551, 557(c), sets this standard for agency decisions:

> "All decisions, including initial, recommended and tentative decisions, are a part of the record and shall include a statement of (A) findings and conclusions, and the reasons or basis therefor, on all the material issues of fact, law, or discretion presented on the record; and (B) the appropriate rule, order, sanction, relief, or denial thereof." (emphasis added)

The Court of Appeals in Nader v. F.C.C., 520 F.2d 182 (D. C. Cir. 1975) recently summarized judicial requirements for upholding an agency decision under §557(c) of the Administrative Procedure Act:

> "The agency must articulate a 'rational connection between the facts found and the choice made.' While we may not supply a reasoned basis for the agency's action that the agency itself has not given, we will uphold a decision of less than ideal clarify if the agency's path may reasonably be discerned."

519 F.2d at 192 (emphasis added; citations omitted). Clearly, paragraph 22 does not meet even this minimal test.

Finally, CBEMA has previously made clear that the cross-subsidy questions identified by the Bureau exist apart from any interpretation of the Computer Inquiry. Thus, while the Computer Inquiry policies seem clearly to govern the Dataspeed 40 tariff, should the Commission disagree with this view, serious cross-subsidy questions would still remain which the Bureau has failed to rule on. In Docket No. 20003, for example, the Commission recognized that carrier participation in competitive terminal equipment markets may raise continuing cross-subsidy questions and numerous possibilities for unfair competition.[1] CBEMA has proved in its *Reply* analysis that these kinds of questions exist with the Dataspeed 40 items, and the record below confirms one significant cross-subsidy factor, the use of large numbers of the Dataspeed 40 items for internal Bell System purposes, presumably to be paid for mostly out of monopoly service revenues. The Record therefore cannot provide support for the apparent contention of paragraph 22 that sufficient cost justification for the Dataspeed 40 items had been submitted, and the necessary material would *still* be required before the tariffs should be allowed to become effective.

---

[1] *See*, 46 F.C.C.2d at 218:

> "If the markets for interconnect equipment and systems do not have the unique characteristics which would warrant such monopoly treatment, we also solicit views as to what, if any special conditions should be placed on telephone company participation in these markets. For example, should such suppliers of both monopoly and competitive services be required to establish separate corporate entities, maintain separate accounts, use separate operating personnel and facilities or adopt other measures to avoid the cross-subsidization of their competitive offerings by their monopoly services?"

See also, Land Mobile Services in the 900 MHz Frequency *Band*, Docket No. 18262, 51 F.C.C.2d at 951 (1975), where the Commission ordered telephone carriers to form separate corporations to enter the competitive mobile telephone service markets in the 900 MHz band.

Conclusion

In this petition for limited review, CBEMA has sought to preserve major objections to the Dataspeed 40 tariff, raised by us below and not disposed of by the Bureau's Memorandum Opinion and Order. CBEMA supports the result obtained in the Bureau's Order and the rationale behind that conclusion. Should the Commission disagree with the Bureau, however, we respectfully suggest that the cross-subsidy questions raised below are still outstanding, that they go to the heart of a judgment on a tariff for a new product in a competitive market, and that orderly consideration should be given to them before the Dataspeed 40 tariffs are ever put into effect.

Respectfully submitted,

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April 2, 1976

Appendix A
Appendix B

APPENDIX A

Documents and information submitted

by AT&T concerning Dataspeed 40.

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

February 3, 1976

IN REPLY REFER TO:
9540

RECEIVED
FEB 05 1976
M.W.K

TO: All Parties of Record

FROM: Edward DeVaughn

SUBJECT: AT&T Transmittal No. 12449, filed November 18, 1975
amending AT&T Tariffs FCC Nos. 260 & 267

List of Documents Received From AT&T Pursuant to the Request of Common Carrier Bureau Staff.

1. Market Research - DATASPEED 40 Market Study - January 1974
2. How to Operate -- Synchronous DATASPEED 40 terminals, Provisional Issue C. - November 1975
3. Draft -- Market Forecasts for Synchronous DATASPEED 40, (1975?)
4. Cluster Controller Survey - (1975?)

*5. Remote Computer Markes, Communications, Terminals & Applications, 1974-1980, Volume Four, Quantum Science, 1975

6. DATASPEED 40 - Features, August 1973
7. Teletypewriter Compatible DATASPEED 40 - GS: 75-11-135 - November 24, 1975
8. Teletypewriter Compatible DATASPEED 40 - GS: 75-10-062 - October 8, 1975
9. DATASPEED 40 - Multipoint Private Line - GS: 74-08-114 - August 16, 1974
10. DATASPEED 40 8A1/8B1 Selective Calling Station - GL: 74-07-125
11. DATASPEED 40 - GL: 73-06-147 - June 22, 1973
12. DATASPEED 40 - GS: 73-06-100 - June 22, 1973

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* With the exception of the Quantum Science Study, all of the above items have been placed in the public file. We expect AT&T to release the Quantum Science Study for the public file within a short period of time.

[illegible]

[illegible]

14. Teletype Pocket Reference 40-1-40-2-40-3 (1975)

✓15. Engineering Letter GL: 75-09-150, September 19, 1975
Synchronous DATASPEED 40 [illegible]

✓16. Engineering Letter GL: 75-09-188, September 29, 1975
Synchronous DATASPEED 40 [illegible]

[illegible]

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American Telephone and Telegraph Co.
Long Lines Department
32 Avenue of the Americas
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AT&T Long Lines
32 Avenue of the Americas
New York, N. Y. 10013
Phone (212) 393-6531

William V. Catucci
Attorney

February 25, 1976

RECEIVED
FEB 27 1976
MWK

Mr. Walter R. Hinchman, Chief
Common Carrier Bureau
Federal Communications Commission
Room 500
1919 M Street, N. W.
Washington, D. C. 20554

Dear Mr. Hinchman:

Re: DATASPEED® 40

This is in response to your letter dated February 11, 1976 (Reference 9540), requesting additional information to assist the Commission in its consideration of American Telephone and Telegraph Company's DATASPEED® 40 tariff filing (Transmittal No. 12449).

1. a. (Provide) all internal memoranda, documents and correspondence relating to the A. D. Little Special Study Meeting Notes, Outlook For Computer Terminals in a Changing Competitive Environment, June 1975.

Answer

To our knowledge there are none.

Publication Requests

b. Publication #582-200-100 - provided
c. " #582-211-100 - provided
d. " #579-505-353 - provided
e. " #999-300-121 - to be provided
f. " #999-300-123 - provided
g. Teletype Catalog, Model 40 Printer for OEM's March 1975 edition - provided
h. Teletype Catalog, Model 40 data Terminals, October , 1974 - provided
i. Any other Teletype Model 40 catalogs - provided

2. Does the Bell System currently provide, or plan to provide to users any type of software support for the DATASPEED 40 at any time within the next five years? If so, provide a description of the type of support planned or provided.

__Answer__

In those instances where communications terminals, such as the DATASPEED 40 or teletypewriters are used in conjunction with a customer's computer, it is necessary that the computer's communications software be specifically compatible with the communications terminal in order to function as a data communications system. Thus, the Bell System offers to its customers the specific information and advice necessary to enable them to achieve compatibility of their software with their communications system.

The Bell System provides customer support for its services (such as data sets and teletypewriters which are part of a customer's overall communications system. The information and advice is of a detailed technical nature and explains the features, functions, and communications portocols used by the products. The types of customer support include:

- Information on local features

- Information on on-line communications features such as link control and terminal control characteristics.

- Information on system compatibility

3. Are there any plans within the next five years to provide DATASPEED 40 users with the ability to change, alter or modify any of the programs presently contained in the DATASPEED 40?

__Answer__

No.

4. Describe what microprocessors and microcomputers, if any, are used in the DATASPEED 40. For each microprocessor or microcomputer describe the following:

   a. Device manufacturer and model number
   b. Specific model DATASPEED in which used
   c. Where utilized (e.g., keyboard display, printer controller)
   d. Instruction repertoire

   Answer

   The DATASPEED 40 does not use integrated circuits of the microprocessor or microcomputer category. The Station, Device and Mini Controllers of the DATASPEED 40 were designed by Teletype Corporation and use commercial and Teletype manufactured integrated circuits. Both medium scale (MSI) and large scale (LSI) integrated circuits are used in the DATASPEED 40.

5. For each read only memory (ROM) and each random access memory (RAM) used in the DATASPEED 40 Controllers (Device Cluster Controller, Station Cluster Controller, Mini Cluster Controller) provide the following information:

   a. Manufacturer and model number
   b. Specific model DATASPEED in which used
   c. Where utilized
   d. Instruction repertoire

   Answer

   a. See Attachment A
   b. Used in DATASPEED 40/4
   c. See Attachment A
   d. Not applicable, as instruction repertoire is not a function of the ROM or RAM.

6. Describe how the DATASPEED 40 (models 1, 2 and 3) have been used internally within the Bell System. In any instance, has the DATASPEED 40 been tied directly to a computer system? Provide a breakdown, by model no., of the DATASPEED 40s currently in use in the Bell System.

Answer

The DATASPEED 40 (models 1, 2 and 3), like the Models 33 and 35 teletypewriters, are used internally by the Bell System in the following applications:

a. Multi-point and point-to-point private line systems.
b. Terminals for time-sharing and computer input/output.

In some internal applications the DATASPEED 40 has been tied directly to a computer system via a room circuit. For example, the Bell Laboratories' #4ESS office uses the 40/1 as an integral part of the overall system.

We estimate that the following DATASPEED 40s are currently in use internally in the Bell System.

a. 40/1 - approximately 300 terminals
b. 40/2 - approximately 200 terminals
c. 40/3 - approximately 400 terminals

7. Describe the planned uses within the next three years for the DATASPEED 40/4 in the Bell System.

Answer

The DATASPEED 40/4 is used in the Western Electric Company designed merchandizing system called the Cost Bulletin System. In addition, the 40/4 is used in the Bell Laboratories' designed network management system called Switched Access Remote Test System (SARTS) and Circuit Management System (CMS).

The Bell System Operating Companies are currently evaluating the 40/4 for possible use in customer order and service writing systems for internal application.

8. How many DATASPEED 40/4s are planned to be installed in the Bell System within the next five years?

Answer

The forecast for DATASPEED 40/4 KDs for 1976 Bell System internal use is 1700. A five year forecast for internal applications has not been made.

Very truly yours,

Copies to:

J. Roger Wollenberg, Esquire
David R. Anderson, Esquire
Wilmer, Cutler & Pickering
1666 K Street, N. W.
Washington, D.C. 20006 (IBM)

Joseph M. Kittner, Esquire
McKenna, Wilkinson & Kittner
1150 Seventeenth Street, N. W.
Washington, D.C. 20036 (CBEMA)

Terry G. Mahn, Esquire
Computer Industry Association
Suite 801
1911 Fort Myer Drive
Rosslyn, Virginia 22209 (CIA)

Integrated Circuit Type		Similar To Standard Part No.	Controllers Used In
RAM	INTEL	2107B	MCC, SCC, DCC
	Texas Instruments	TMS4060	
"	Fairchild	93405	" " "
	National	DM8599	
	Texas Instruments	SN74S189	
ROM	Harris	HMI-7621-5	" " "
	INTEL	D3622	
	Intersil	IM5624CDE	
	Monolithic Memories	6306	
"	INTEL	3604	MCC, DCC
	Monolithic Memories	H6240D, H6340D	
	National	DM8795J	
"	Intersil	IM5610	" "
	Signetics	N82S123, N82S223	
"	Fairchild	93426	MCC, SCC, DCC
	Intersil	IM5623	
	National	DM8597	
	Signetics	82S129, 82S229	

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New York, N. Y. 10013
Phone (212) 393-6531

William V. Catucci
Attorney

March 26, 1976

RECEIVED
MAR 29 1976
MWK

Joseph M. Kittner, Esq.
McKenna, Wilkinson & Kittner
1150 Seventeenth Street, N. W.
Washington, D. C. 20036

Re: DATASPEED ® 40

Dear Mr. Kittner:

This is in response to your letter dated March 10, 1976 requesting information relating to DATASPEED 40 which was referred to by the Chief, Common Carrier Bureau in his Memorandum Opinion and Order of March 3, 1976.

On March 22, 1976 I discussed this request with Ms. Virginia Carson of your office. As Ms. Carson noted, various letters have been sent to the parties of record in this matter listing documents provided by AT&T to the Common Carrier Bureau Staff. I refer to a February 3, 1976 letter from Mr. DeVaughn of the F.C.C. to all parties, (File Ref. 9540) and a February 25, 1976 letter from AT&T to Walter R. Hinchman.

In addition to documents mentioned in the above letters, the following were provided by AT&T to the Commission Staff:

- Engineering Letter GL: 75-09-150
- Engineering Letter GL: 75-09-188

AT&T considers the material provided the Commission Staff proprietary in nature and expects that all such material will be returned to AT&T.

Very truly yours,

APPENDIX B

Questions raised in CBEMA's Reply to Opposition regarding cost justification for Dataspeed 40 items.

From the economic analysis in Section I above, it is clear that AT&T has not passed this preliminary requirement of submitting data necessary to a full evaluation of the tariff. The Commission should require the full information including answers to the following questions or items of needed material:

(1) A breakdown of the costs incurred in the research and development of all the DATASPEED 40 items, by item and by organization of the Bell System, such as BTL, AT&T, Western Electric and Teletype.[2]

(2) Identify the product line (or lines) of Teletype Corporation or Western Electric to which the DATASPEED 40 items belong. Indicate the number of individual products within each product line.

(3) How are the labor, material and overhead costs allocated among the equipment in each product line identified above? a) if standard costing was used; b) if normalized costing was used.

(4) What price factor (or factors) was chosen for the DATASPEED 40 items? Is the same price factor applied equally on all products in the product line?

(5) Specify the warranty costs for DATASPEED 40 items and describe how they were derived. Were they averaged or were they allocated specifically to DATASPEED 40 items?

(6) Specify the maintenance training developed and employed for repair personnel working with DATASPEED 40 items. Which organizations in the Bell System paid for or plan to pay for the above maintenance training? If more than one organization, list the contribution of each.

(7) Specify the rate of return on investment expected a) by Long Lines and b) by the manufacturer of the DATASPEED 40 items. For both the manufacturer and Long Lines, give the rate of return for the other items in the product line of the DATASPEED 40 items.

(8) Is the above rate of return set to cover the fully allocated costs of DATASPEED 40 items or the incremental costs?

(9) Itemize the expenses incurred in marketing the DATASPEED 40 items including market surveys or forecasts, training of sales personnel, advertising and any other expenses. Answer by reference to the Bell System organization which incurred the expenses.

(10) Supply the market forecasts or studies, both internal and external to the Bell System, used to determine the likely volume of DATASPEED 40 items to be tariffed by Long Lines.

(11) Specify any internal purchases of DATASPEED 40 by Bell System organizations. What price was paid (or will be paid) to Teletype or to Western Electric for these items of equipment? Is any price discount obtained by Bell System organizations on DATASPEED 40 equipment used for internal needs?

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of)
)
AMERICAN TELEPHONE AND) Transmittal No. 12449
TELEGRAPH COMPANY)
)
Revisions to Tariff)
F.C.C. Nos. 260 and 267.)

COMMENTS IN SUPPORT OF APPLICATION FOR REVIEW

GTE Service Corporation and its affiliated domestic telephone operating companies (GTE), pursuant to Section 1.115 of the Commission's Rules, hereby supports the request of American Telephone and Telegraph Company (AT&T), for review and reversal of the Memorandum Opinion and Order, released March 3, 1976 (Mimeo No. 61760), by the Chief, Common Carrier Bureau, allegedly acting pursuant to delegated authority, which rejected revisions to AT&T's Dataspeed 40 service tariff, for the reasons set out below:

Interest of GTE

1. GTE provides communications services which include teletypewriters and other terminal devices and, therefore, the ruling of the Chief, Common Carrier Bureau directly affects GTE.

Action by Bureau Chief is Not Consistent with Established Commission Policy

2. The Commission's Rules, adopted after extensive comment,[*/] defines data processing as follows:

> "(a) For the purpose of this subpart - (1) 'Data Processing' is the use of a computer for the processing of information as distinguished from circuit or message-switching. 'Processing' involves the use of the computer for operations which include, inter alia, the functions of storing, retrieving, sorting, merging, and calculating data, according to programed instructions."

The Rules also define what is not data processing. Thus, in Section 64.702(2), it is provided that data processing does not encompass:

> "... computer controlled transmission of messages, between two or more points, via communications facilities, wherein the content of the message remains unaltered."

Some action altering the content of a message is, therefore, required to bring communications services into the category of data processing. The mere provision of terminal equipment to customers in conjunction with a communication path does not create a data processing service.

3. Dataspeed 40/4 is not a data processing service. The Dataspeed 40/4 is merely the unit used to send and receive messages, with message content totally under the control of the customer. In simplest terms, it is a technologically improved

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[*/] FCC Docket No. 16979, Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities, 28 F.C.C.2d 267 (1970).

teletypewriter. The fact that the terminal may be connected directly to a Central Processing Unit (CPU), thereby eliminating two conversions and many hours of work (computer to printed page, printed page to paper or magnetic tape, etc.) does not make the Dataspeed 40/4 terminal a data processing terminal. The rules and the characteristics of the Dataspeed 40/4 service clearly show that a communications service is being provided and that the Bureau Chief's action and order is in error and must be reversed.

WHEREFORE, for the reasons set out above, and in AT&T's April 2, 1976 Application for Review, GTE Service Corporation and its affiliated domestic telephone operating companies urge that the Commission reverse the action of the Chief of the Common Carrier Bureau with respect to Transmittal No. 12449.

Respectfully submitted,

GTE SERVICE CORPORATION and
Its Affiliated Domestic Telephone Operating Companies

By /s/ Vincent Gallogly
Vincent Gallogly
One Stamford Forum
Stamford, Conn. 06904

Their Attorney

Dated: April 15, 1976

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of	)	
	)	
AMERICAN TELEPHONE AND TELEGRAPH COMPANY	)	Transmittal No. 12449
	)	
Revisions to Tariff F.C.C. Nos. 260 and 267.	)	

COMMENTS IN SUPPORT OF APPLICATION FOR REVIEW

The United States Independent Telephone Association (USITA) hereby respectfully submits the following comments in support of the American Telephone and Telegraph Company (A.T.&T.) "Application For Review" of the March 3, 1976 Memorandum Opinion and Order, Mimeo No. 6176, (Order), in which the Chief, Common Carrier Bureau, rejected "Dataspeed 40 Service" tariff revisions filed by A.T.&T. under A.T.&T. Transmittal No. 12449.

The Order is erroneous, USITA submits, on three counts:

1. The Order far exceeds the Commission's limited rejection authority;
2. The Order is well beyond the delegated authority of the Chief, Common Carrier Bureau;
3. The Order, on the merits, is demonstrably wrong.

I. The Bureau Chief's Rejection Exceeded The Commission's Limited Rejection Authority.

The Congress has granted FCC specific and limited statutory authority to reject an interstate telephone service tariff. Section 203(d) of the Communications Act (47 U.S.C. 203(d)) provides:

> "The Commission may reject and refuse to file any schedule entered for filing which does not provide and give lawful notice of its effective date. Any schedule so rejected by the Commission shall be void and its use unlawful."

No other authority to reject a tariff filing at the door has been granted to FCC by the Congress.

While decisions of the FCC and the Courts have expanded somewhat the statutory tariff rejection language, no decision has ever asserted authority for or approved the kind of rejection action taken here. FCC itself has summarized the grounds on which it claims that a proposed tariff revisions may be rejected, as (1) failure to provide notice of effective date as required by Section 203(d), (2) lack of required authority on part of the carrier to implement a proposed tariff offering,[1] and (3) prima facie unlawfulness, such as being demonstrably in conflict with the Communications Act, a Commission rule, regulation, or order. See *MCI Telecommunications Corp.*, ____ FCC 2d ______ (mimeo 47264, March 7, 1975). In the *Associated Press* case, the Court stated that an administrative agency:

> ". . . has the power and in some cases the duty to reject a tariff that is demonstrably unlawful on its face. Thus an agency will reject a tariff that conflicts with a statute,

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[1] Citing *Matter of Press Wireless, Inc.* 25 FCC 1466 (1958); *Matter of RCA Communications, Inc.*, 34 FCC 171 (1963).

> or with a rate fixed in a contract sanctioned by statute; similarly, a tariff will be rejected if it is unlawful without prior agency approval, and such approval has not been obtained. . . ." 448 F.2d, at 1103; 145 U.S. App. D. C., at 180 (1971).

Succinctly stated, as it was by the Court in Municipal Light Boards, Etc. v. FPC, 146 U.S. App. D. C. 294 (at 299) 450 F.2d 1341 (at 1346) (1971); cert. den. 405 U.S. 989 (1972), tariff rejection is appropriate ". . . where the filing is so patently a nullity as a matter of substantive law that administrative efficiency and justice are furthered by obviating any docket at the threshold rather than opening a futile docket."

The detailed and in depth discussion of the Dataspeed service offering contained in paragraphs 10-20 of the Order, including the specific reference to "After reviewing the various materials filed . . . and the various pleadings thereon" (Order, ¶15) make it clear beyond dispute that the Dataspeed 40 tariff amendment was not "demonstrably unlawful on its face." The Order's conclusion of unlawfulness obviously required, in fact, a new construction and interpretation of both the tariff amendments and Commission policy and an original judgment on the basis of that construction and interpretation -- clearly not a demonstration of "so patently a nullity" on the face of the tariff that justice requires "obviating any docket at the threshold. . .". Thus, even had the tariff rejection in question been by act of the Commission itself, this rejection would have been fatally flawed as beyond the rejection authority of the Commission.

II. The Order Is Well Beyond Delegated Authority.

Necessarily, if the Order exceeds the authority of the Commission itself, it is well beyond the authority delegated by the Commission to the Chief, Common Carrier Bureau. That the Chief's action is unauthorized by his delegations of authority, even if his action would have been within the Commission's limited rejection authority, is readily demonstrable.

Excluded from the delegation of authority to the Chief is ". . . authority to act on any applications or requests which present novel questions of fact, law or policy which cannot be resolved under outstanding precedents or guidelines" (Rules, Sec. 0.291(a)(2); 47 C.F.R. 0.291(a)(2)). In this case, the ruling of the Chief is unquestionably "novel" -- this is clearly a case of first impression -- and additionally, the question resolved by the Order is not resolved "under outstanding precedents and guidelines," but rather by a novel interpretation of those precedents and guidelines. This function, in short, has in no way been delegated by the Commission to the Chief, Common Carrier Bureau.

III. On The Merits, The Order Is Demonstrably Wrong

In essence, the Order would establish as the dividing line between a communications service and data processing whether the communication is directed to a computer.

To but state the test is to demonstrate its absurdity. Presumably, if inquiry to a computer is person-to-person, i.e., human to human to computer to human to human, the Order would not question the fact that the communication service is indeed unquestionably a communication service, even though the customer may have directed his communication to his computer. Apparently, at least in the view of the Order, automation of this identical communication service would change its basic nature from a communication service to data processing. This is so, according to the Order, even though the data processing function is still performed by the customer's computer, not the carrier's communication service offering.

The logic of the Order's test would suggest, then, that as long as carriers utilize human intervention, e.g., operator assist message telephone service, the service remains a communications service. But if the operator is eliminated through mechanical or electronic switching, the Order would suggest a new, non-communication service is being provided. Under this theory, telephone companies would be precluded from introducing improved or innovative technology, with that field being reserved for data processing entrepreneurs.

That this is the meaning or intent of the Commission's computer rules is doubtful at best. Moreover, that telephone companies are limited by the Commission's rules to providing manual input to customer's computers appears to be out of touch with reality. Additionally, as the court indisputably held,[2] it is not the Commission's function to regulate competition in the data processing field, and this restriction cannot be avoided by expanding the field to include communications directed to a computer, characterizing improved common carrier communications directed to a computer, charterizing improved common carrier communications services as "data processing", and those prohibiting the offering of those services by telephone companies.

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[2] GTE Service Corp. v. FCC, 474 F.2d 724 (2 Cir. 1973).

In short, a communications service is not converted into a data processing service by changes in technology. The performance of precisely the same communications function by a person or by a machine does not change the nature of the communications function. Whether inquiry of a customer's computer is by human voice or is by a "Dataspeed 40" machine does not change the nature of the communication service offering.

WHEREFORE, USITA respectfully suggests that the A.T.&T. Application For Review should be granted, and the Order reversed.

Respectfully submitted,

CHADBOURNE, PARKE, WHITESIDE & WOLFF

/s/ Thomas J. O'Reilly
Thomas J. O'Reilly
Counsel for
United States Independent
Telephone Association

1150 - 17th Street, N. W.
Washington, D. C. 20036

April 30, 1976

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
AMERICAN TELEPHONE AND TELEGRAPH)
COMPANY, LONG LINES DEPARTMENT) Transmittal No. 12449
)
AT&T Transmittal No. 12449,)
November 18, 1975)
)
Revisions to Tariff F.C.C. Nos.)
260 and 267.)

OPPOSITION

American Telephone and Telegraph Company ("AT&T"), pursuant to Section 1.115(d) of the Commission's Rules, hereby opposes the Petition for Limited Review ("Petition") dated April 2, 1976, filed by the Computer and Business Equipment Manufacturers Association ("CBEMA") with respect to the above-captioned matter.* In support whereof, AT&T respectfully states as follows:

1. In this Petition CBEMA asks for limited review of the Memorandum Opinion and Order of the Chief of the

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* In a Motion dated April 9, 1976 IBM requested an extension of time in which to file oppositions to AT&T's Application for Review and CBEMA's Petition for Limited Review herein. In a letter dated April 12, 1976 the Chief of the Common Carrier Bureau extended to April 30, 1976 the deadline for filing oppositions to the above-described petitions.

Common Carrier Bureau released March 3, 1976 (Mimeo No. 61760) in which the Bureau Chief purportedly acting pursuant to delegated authority rejected the most recent revision to AT&T's Dataspeed 40 tariff offering (termed Dataspeed 40/4).* The Bureau Chief took this action on the basis that the Dataspeed 40/4 tariff offering assertedly constituted an offering of data processing and accordingly was contrary to the Commission's computer inquiry rules and policies.** In the Order, the Bureau Chief dismissed CBEMA's contentions that the cost justification supplied by AT&T in connection with the tariff filing did not comply with the requirements of Section 61.38 of the Commission's Rules and expressly held that the material submitted by AT&T was not violative of Part 61 of the Rules (Order, para. 22).

2. On April 2, 1976 AT&T filed an Application for Review which urged that the Commission immediately reverse the Bureau Chief's action. The Application showed that the Bureau Chief's tariff rejection was in direct conflict with the Communications Act and the Commission's Rules and policies because the

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* Dataspeed is a registered trademark of AT&T. Dataspeed service is presently offered by AT&T and the Bell System companies pursuant to effective interstate and intrastate tariffs.

** Docket No. 16979, Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities, 28 F.C.C.2d 267.

offering of Dataspeed 40/4 constitutes a communications service and not data processing. This is so because the function performed by Dataspeed 40/4 service is to transmit messages, the contents of which are controlled by the customer and wherein the contents of the messages remain unaltered by the carrier. The Dataspeed 40/4 offering is simply a technologically updated teletypewriter service, a communications service which has been offered by AT&T pursuant to tariff for more than forty years. Also, AT&T stated that rejection of the tariff on substantive grounds as announced in the Order was contrary to the statutory plan of the Communications Act. If there were, in the Commission's view, any open questions of decisional significance, AT&T requested that the tariff should be permitted to go into effect pending Commission resolution of such questions.

3. In the instant Petition for Limited Review CBEMA challenges the Chief's finding that the cost justification submitted by AT&T in connection with the tariff filing complies with the requirements of Part 61 of the Commission's Rules. Essentially CBEMA asserts that this part of the Chief's Order is inconsistent with the rest of the Order and is against the weight of the evidence in the record. Because CBEMA supports the result of the Chief's action, it requests that this Petition for Limited Review be considered on a "contingency basis" in the event that the Commission disagrees with the Bureau Chief on one or more major points and decides to provide for further proceedings

in this matter. In that event CBEMA requests that consideration should be given to the cost questions which it raises before the Dataspeed 40/4 tariffs are put into effect.

4. CBEMA's Petition for Limited Review is wholly without merit and should not be granted. The material submitted by AT&T in connection with the tariff filing does in fact meet the requirements of Section 61.38 of the Commission's Rules and in any event the material provided is such that it provides no legitimate basis for rejecting this tariff or granting the other extraordinary relief requested here by CBEMA. In addition, the holding of the Chief that the cost information provided by AT&T meets the requirements of Part 61 of the Rules is not inconsistent with the rest of his order.

5. The Chief's rejection of the Dataspeed 40/4 tariff was assertedly made on the basis that the offering was data processing and contrary to the Computer Inquiry Rules and polices and the cost and cross-subsidy issues addressed by the Commission in its Computer Inquiry and referred by the Chief in the Order are totally distinct from the cost and cross-subsidy issues related to the requirements of Part 61 of the Commission's Rules. In the Computer Inquiry the Commission decided that the allocation of costs between unregulated data processing services and regulated common carrier communications services raised the possibility that the regulated communications services (whether

monopoly or competitive) could subsidize the unregulated data processing service. In that proceeding the Commission adopted rules requiring "maximum separation" in the provision of these services. On the other hand the allocation of costs between various regulated common carrier communication services is actually required by the Commission. Where only common carrier communications services are involved, cross-subsidy questions only arise if it can be shown that the rates for a particular service will not recover the relevant costs allocated to that service. Thus, it is not inconsistent to hold that if a service is a data processing service offered by a carrier it raises Computer Inquiry type cross-subsidy questions and, on the other hand, still find that if the same service is a communications service, the cost justification submitted is sufficient to shown that all relevant costs will be recovered through the proposed rates and that cost information which was supplied meets the requirements of Part 61 of the rules. This is precisely what the Chief held and although AT&T strongly disagrees with his characterization of Dataspeed 40/4 service there is no inherent inconsistency in his action insofar as cross-subsidy questions are involved.

6. Thus, the crux of the matters raised by CBEMA in its Petition is whether or not AT&T's Dataspeed 40/4 offering is data processing or communications service. If it is the former AT&T may not offer it. If it is the latter the Chief has held that the cost justification submitted with the tariff filing meets the requirements of Part 61. As will be shown below, CBEMA presents no valid basis for overturning the Chief's determination of this question.

7. Section 61.38 of the Commission's Rules provides that certain material explaining and supporting tariff changes or new tariff offerings must be submitted in connection with tariff filings. In compliance with this Section, AT&T submitted an extensive statement explaining the Dataspeed 40/4 service being offered, the reasons for the filing, and the basis of the ratemaking employed. This material included extensive market and cost data including cost of service studies, a projection of costs for a three year period and estimates of the effects of the service upon present services and revenues.* In fact, the material submitted is substantially similar to the materials which have regularly been supplied by AT&T in support of previous tariff submissions and which have been held by the Commission to be in full compliance with the requirements of Section 61.38.**

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* CBEMA's stated concerns regarding possible cross-subsidy of the design, development and manufacturing costs of Dataspeed 40/4 are without any factual basis since Dataspeed 40 terminals are manufactured by Teletype Corporation, a completely separate subsidiary and all design, development and manufacturing costs of this equipment are completely segregated from all other Bell System costs. See AT&T's Application for Review, footnote at p. 19.

** CBEMA's statement that " . . . the Bell System did not deny that the Bureau needed the information detailed by CBEMA, and it did not deny that the full, required information in the areas outlined had not been supplied. . . ." (Petition, p. 9) is puzzling since AT&T affirmatively stated that "In any event, the material submitted by AT&T does, in fact, fully meet the requirements of Section 61.38 and establishes the appropriateness of the instant revisions. . . ." (AT&T Opposition, January 9 1976, p. 20.)

8. Moreover, the information supplied by AT&T showed that for the first three years the projected revenues for Dataspeed 40/4 service would exceed the relevant costs of that service by $4.9 million, an excess of revenues over costs of 15.5%. This was so even given the fact that this data was developed on the basis of a 12% return on the additional investment. Thus, it was shown that Dataspeed 40/4 is expected to make a contribution toward meeting the common costs of the company and benefit the users of other services including MTS users. In other words, the data submitted showed that CBEMA's concerns about cross-subsidies flowing from AT&T's monopoly services are unfounded. In fact the rates proposed for Dataspeed 40/4 service are designed to benefit the users of the monopoly services by permitting the rates for these services to be lower than they would otherwise have to be.

9. It is of significance that CBEMA has never actually challenged the appropriateness of the rate levels or rate structure embodied in the tariff. Instead, it appears that CBEMA is raising these cost questions in the hope of delaying or preventing the provision of Dataspeed 40/4, a service with which its members compete.

10. CBEMA tries to make much of the fact that the Common Carrier Bureau asked for and received additional information

from AT&T regarding its Dataspeed 40/4 offering. CBEMA points out that after having reviewed both the material formally filed pursuant to Section 61.38 as well as the additional information, the Chief held that the material supplied met the requirements of Part 61 of the Commission's Rules. It is important to understand that the additional information to which CBEMA refers was supplied by AT&T in response to informal requests including a letter of the Chief, Tariff Division, acting for the Chief of the Common Carrier Bureau.* That letter made no mention of Section 61.38 of the Commission's Rules but simply listed certain information which was requested regarding AT&T's Dataspeed 40/4 tariff filing. This information was supplied by AT&T in accordance with Section 218 of the Communications Act which requires carriers to provide information requested by the Commission in connection with the performance of its functions. Included in the additional information provided by AT&T were market study data, information regarding projected internal Bell System use of Dataspeed 40/4 service and technical information relating to Dataspeed 40/4 terminal equipment. After having reviewed all the material supplied by AT&T, the Bureau Chief properly held that the material complied with the requirements of Part 61 of the Commission's Rules.

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* Letter, dated February 11, 1976, from Ruth V. Reel, Chief, Tariff Division, for Chief Common Carrier Bureau to W. E. Albert, AT&T Administrator, Rates and Tariffs.

11. Moreover, objections of the sort raised by CBEMA regarding compliance with the requirements of Section 61.38 cannot be relied on as justification for the rejection of a tariff or as justification for the extraordinary relief requested in CBEMA's instant Petition for Limited Review. The Commission has determined that allegations similar to those made by CBEMA in the present context concerning alleged failure to provide adequate supporting data under Section 61.38 did not constitute grounds for rejection. The Commission has held:

> "In our judgment, the cost, revenue, and other data submitted by AT&T in justification of the proposed tariff changes sufficiently satisfies the requirements of §61.38 to permit the acceptance for filing of the new schedules. It is a separate and distinguishable issue, however, whether the submitted data establishes that the proposed tariffs are just and reasonable and otherwise lawful under the Communications Act. The resolution of that issue should be made through the hearing process."
> (33 F.C.C.2d 522, 523 (1972).)

See also, *American Farm Lines* v. *Black Ball Freight Service*, 397 U.S. 532, 538-39 (1970); *Associated Press* v. *FCC*, 448 F. 2d 1095, 1104 (D.C. Cir. 1971).

12 . In an opinion denying a petition to reject an AT&T WATS filing, the Chief of the Common Carrier Bureau stated:

> "Section 61.38 of our rules was not violated here merely because AT&T may have presented no defensible rate-making basis for the rate changes and may not be able to justify the changes at any further hearing or investigation. Our rules require the submission of the data, information and rate-making principles upon which the carrier relies for its proposal irrespective of whether such material is defensible . . . . In the present instance, AT&T's Section 61.38 showing suffices for an appropriate Commission disposition of this filing." (46 F.C.C. 2d 213, 214 (1974); emphasis supplied).

Thus, the Commission has consistently held that the material it requires to be provided under Section 61.38 of its Rules need only indicate that the rate has prima facie support and that if this prima facie showing is made, the tariff must be permitted to go into effect. If the Commission nonetheless believes that there are significant disagreements relating to the substance of the material provided pursuant to Section 61.38, or that there are questions regarding the lawfulness of the tariff rates or regulations then, it may set the tariff for investigation and hearing. Indeed, recognizing that it did not have the authority to require that a tariff obtain its approval prior to going into effect, the Commission in its Order adopting Section 61.38 provided the following explanation of the type of showing it required under that Section:

> ". . . While there is no requirement for Commission approval before a rate can become effective, it is within our authority to require that a rate be supported by sufficient information to indicate that the rate has prima facie support. . . ." (25 F.C.C.2d at 965.)

13. CBEMA does not even claim that AT&T has failed to meet this prima facie standard and in fact the material submitted by AT&T meets and exceeds the requirements of Section 61.38. In any event CBEMA presents no justification for rejecting the Dataspeed 40/4 tariff filing for failure to comply with Section 61.38 or for granting the novel and extraordinary relief that it now requests. In point of fact, its assertions do not go to the issues of compliance, but rather to the lawfulness of the rates involved. It has been held that rejection and similar extraordinary forms of relief do not lie in these circumstances. American Farm Lines v. Black Ball Freight Service, supra; Associated Press v. FCC, supra. As AT&T has previously explained, if the Commission believes that CBEMA has raised matters that warrant further investigation the only course of action which would be consonant with the statutory plan of the Communications Act is to suspend the tariff, permit it to go into effect and institute an investigation and hearing on the tariff filing. However, in view of the fact that this tariff's effectiveness has already been delayed for over five months, we submit that it would be inappropriate to suspend its effectiveness any further at this time. Therefore the tariff should be permitted to go into effect forthwith.

WHEREFORE, for the foregoing reasons it is respectfully requested that the Commission deny the relief requested in CBEMA's Petition for Limited Review.

Respectfully submitted,

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

By /s/ Edward L. Friedman
Edward L. Friedman

By /s/ Alfred A. Green
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April 30, 1976

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
AMERICAN TELEPHONE AND TELEGRAPH)
COMPANY, LONG LINES DEPARTMENT)
)
AT&T Transmittal No. 12449,)
November 18, 1975.)
)
Revisions of Tariff F.C.C. Nos. 260)
and 267)

To the Commission:

OPPOSITION OF INTERNATIONAL BUSINESS MACHINES CORPORATION TO APPLICATION FOR REVIEW

International Business Machines Corporation (IBM) believes the decision of the Chief of the Common Carrier Bureau herein[1] rejecting amendments to tariffs of American Telephone and Telegraph Company (AT&T) for private line and dataphone digital service covering an offering of computer input/output terminals[2] should be affirmed as a proper and lawful application of the Commission's Rules and policies. Therefore, pursuant to Section 1.115(d),

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[1] Memorandum Opinion and Order (March 3, 1976).

[2] AT&T Transmittal No. 12449, Nov. 18, 1975.

IBM hereby opposes the Application for Review filed by AT&T on April 2, 1976.[1]

Introduction

The tariff amendments in question establish rates and regulations for the provision of certain new items of terminal equipment described by the name "DATASPEED 40" or "Teletype 40." The new DATASPEED 40 equipment is described by AT&T as designed to "provide customers with the capability of entering, displaying, editing, printing, sending and receiving data in a data communications system."[2] The tariff provisions also describe an information-storage capacity. Transmittal No. 12449 does not describe in detail the intended customer uses of the new DATASPEED 40 terminals. However, the intrastate tariff relating to DATASPEED 40 filed by the New York Telephone Company with the New York Public Service Commission on October 14, 1975, states that:

> "Synchronous Private Line DATASPEED 40 Service is furnished for communication

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[1] The Chief of the Common Carrier Bureau granted on April 12 a request filed by IBM for an extension of time for opposing the application until today (April 30). On April 15, GTE Service Corporation filed comments in support of AT&T's application. Since these comments do not raise any issues not contained in AT&T's application, we do not address it separately.

[2] Transmittal No. 12449, Attachment, "Explanation and Justification for the Filing," at 1-2 (Nov. 18, 1975).

> between a subscriber-provided computer and DATASPEED 40 stations." 1/

According to that filing, while the earlier asynchronous versions of DATASPEED 40 could be used "in message oriented systems which in the past would have utilized teletypewriter equipment," the new synchronous DATASPEED 40/4 -- the subject of the present proceeding -- was designed "for applications requiring efficient data preparation and retrieval." Ibid.

IBM, in opposing the tariff below, argued that, because the proposed DATASPEED 40 would function as an integral part of a data processing system 2/ and its communications functions are of the incidental character

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1/ New York Telephone Co., Tariff P.S.C. No. 800, § L, ¶ 1, filed Oct. 15, 1975. The New York Telephone Company submission of October 15, 1975, including the tariff provisions and excerpts from the supporting reference material, are attached as Exhibit A to Petition of IBM to Reject or Suspend (Dec. 15, 1975), which is hereby incorporated by reference, as is IBM's Reply to AT&T's Opposition (Jan. 19, 1976).

2/ Computer systems typically consist of a group of electronically interconnected "boxes" (called "hardware") operating in conjunction with or under the control of a set of electronic instructions (called "software"). These boxes are not independently useful -- they must operate together in what is called a computer (or electronic data processing -- EDP) "system."

All computer systems perform three basic functions -- "input," output," and "processing." Organizationally, the center of a system is referred to as the "central processing unit" ("CPU"); the rest of the hardware in the system is called peripheral equipment. The CPU along with software performs the primary control function, performs processing, and often performs storage, input, and output functions as well. Peripheral boxes store information, perform processing and control functions, and provide a means for users to "input" information or data into a computer system and to receive intelligible "output" from the system. See Telex Corp. v. IBM, 510 F.2d 894, 899 (10th Cir. 1975).

found typically in data processing systems involving remote applications, the offering is a data processing service, ineligible under the Commission's Computer Rules[1] to be provided on a regulated, tariffed basis.[2] IBM made clear below and reasserts now that it has no objection to the provision by AT&T of the DATASPEED 40 terminals on an unregulated basis, and suggests again that clarification be sought of the antitrust consent decree which limits AT&T and its operating companies to "the furnishing of common carrier communications service,"[3] if that decree is thought to provide a legal impediment to the provision of DATASPEED 40 through a non-carrier subsidiary.

The Chief of the Common Carrier Bureau, "after reviewing the various materials filed in support of the proposed DATASPEED 40/4 service offering," as well as the pleadings seeking rejection,[1] concluded that it "clearly falls within" the class of equipment "whose primary function, design, and marketing is as an integral part of data processing service." Memorandum Opinion and Order ("Opinion"), ¶ 15. He found that:

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[1] Rules, § 64.702. The full text of the Computer Rules is set forth as Attachment A to this pleading.

[2] IBM and other non-carrier manufacturers offer computer terminal devices performing the same functions as the DATASPEED 40/4 -- indeed, the IBM 3270 is virtually identical. Attachment B, "An Introduction to the IBM 3270 Information Display System," describes the IBM 3270 in detail. See specifically Chapter 4, "Applications."

According to one authority, there are "at least 96 general purpose alphanumeric display terminals from 59 manufacturers" available today. Granholm, Alphanumeric Display Terminals, Datamation, January, 1976, p. 40.

[3] United States v. Western Electric Co., 1956 Trade Cas. 71,134 (D.N.J.) ¶ V.

> "A DATASPEED 40/4 terminal would not be used to communicate with another 40/4 terminal, and it does not even appear to be capable of such communication without the use of data processing equipment external to the terminals." (Opinion, ¶ 16.)

Having found the DATASPEED 40/4 "an offering of data processing service, not offered by an entity separate and apart from AT&T's communications business entities," the Bureau concluded that the offering was "inconsistent with both the Rules and policies established in the Computer Inquiry and [thus] is unlawful on its face." (Opinion, ¶ 20.)[2] In keeping with that finding, the tariff was rejected and returned to AT&T, and AT&T, on April 2, 1976, filed its Application for Review.

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[1] At the request and suggestion of the staff, several on-site demonstrations of various types of equipment involved were held at which members of the staff and representatives of the parties were present and able to ask questions.

[2] The Bureau also determined that "Section 64.702(c) precludes AT&T from offering equipment such as the DATASPEED 40/4 through . . . a subsidiary" and recommended that AT&T deal with this problem by proposing rulemaking seeking a revision of the Rules, or by "reopening of the 1956 Consent Judgment." Opinion, ¶ 21. While AT&T apparently has yet to initiate either step, it appears that the Commission, on its own motion, plans to institute an inquiry to consider "the increasingly complex question of what constitutes data communications vis-a-vis data processing." Speech by Chairman Richard E. Wiley, April 23, 1976, as quoted in 42 Telecommunications Reports No. 17, p. 18 (April 26, 1976).

I. THE ORDER BELOW WAS A PROPER APPLICATION OF THE COMMISSION'S COMPUTER RULES.

In its Application for Review ("Application"), AT&T challenges the rejection of the DATASPEED 40/4 under the Computer Rules, arguing that the Bureau did not adequately consider the *function* which that device performs. (Application at 18.) AT&T also argues that, because the DATASPEED 40/4 simply "represents an evolutionary technological improvement over lower speed teletypewriters provided as a common carrier communications service for over forty years" (*id.* at 7), the device should be classified as a communications service. Finally, AT&T argues that because "the informational content of the message transmitted is . . . controlled by the customer and . . . not altered in transmission by the carrier" (*ibid.*), the Chief should have concluded that the DATASPEED 40 is a communications terminal.

As we will show, the Order is based on a comprehensive analysis of the functions performed by the device and the purposes for which it is intended to be used. Indeed, as the Bureau found, the primary function of the DATASPEED 40/4 is for use as a part of a data processing system. Also, we will show that determining whether a message is altered in transmission does not aid in classifying a device as primarily a data processing terminal or primarily a communications terminal.

A. The Bureau Correctly Determined that the Primary Function of the DATASPEED 40/4 Is Data Processing.

AT&T is correct in its contention that the function and purpose for which a device is used should determine its classification under the Commission's Computer Inquiry Rules. That inquiry was initiated in 1966

> "to provide a public forum for the examination, discussion and resolution of a number of regulatory and policy questions that appeared to be emerging from the growing interdependence of computers and communications services and facilities." 1/

The Commission was faced with two overlapping industries, one of which had traditionally been subjected to its full regulatory powers (communications), and the other of which had developed, substantially free of regulation, in a competitive market (computers). The Commission instituted the Inquiry to determine the extent to which it should regulate the area of overlap.

The Commission rejected the alternative of attempting to regulate the computer industry because it believed that "the market for these services will continue to burgeon and flourish best in the existing competitive environment."

1/ In the Matter of Regulatory and Policy Problems Presented by the Interdependence of Computers and Communications Services and Facilities (Docket No. 16979), Tentative Decision of the Commission, 28 F.C.C.2d 291 (1970) ("Tentative Decision"), modified 28 F.C.C.2d 267 ("Final Decision"), aff'd in part sub nom. GTE Service Corp. v. F.C.C., 474 F.2d 724 (2d Cir. 1973), decision on remand, 46 F.C.C.2d 298 (1973).

Tentative Decision, supra p. 8 n.1, 28 F.C.C.2d at 298. However, the Commission recognized that

> "without appropriate regulatory safeguards, the provision of data processing services by common carriers could adversely affect the statutory obligation of such carriers to provide adequate communication services under reasonable terms and conditions . . . ." Final Decision, supra p. 8 n.1, 28 F.C.C.2d at 269.

Rather than barring carriers from the computer industry altogether, the Commission chose to permit carriers to continue to provide the computer services most intimately identified with communications -- message-switching services -- as a tariffed offering, but to require carriers wishing to provide data processing services to do so under strict rules through a structurally separate subsidiary, in the competitive marketplace.

Often, as the Commission recognized, data processing and communications services are combined in a package offering identified as "hybrid services." To determine which type of service is being offered, the Rules require an examination of "the facts surrounding a package offering with a view toward determining the primary thrust of the service offered." Tentative Decision, supra p. 8 n.1, 28 F.C.C. 2d at 305. The Commission articulated this "primary purpose" test, which is to be applied on a case-by-case basis, as follows:

> "[W]here message-switching is offered as an integral part of and as an incidental feature of a package offering that is primarily data processing, there will be total regulatory forebearance with respect to the entire service whether offered by common carrier or non-common carrier, except to the extent that common carriers offering such a hybrid service will do so through affiliates and will be subject to regulatory safeguards as discussed above.
>
> "If, on the other hand, the package offering is oriented essentially to satisfy the communications or message-switching requirements of the subscriber, and the data processing feature or function is an integral part of and incidental to message-switching, the entire service will be treated as a communications service for hire, whether offered by a common carrier or non-common carrier and will be subject to regulation under the Communications Act." Id.

The Bureau specifically applied this functional analysis to the DATASPEED 40/4 offering, and concluded that the device "clearly falls within the . . . class of equipment . . . whose primary function, design and marketing is an integral part of a data processing system involving the programmed interaction of the terminal device and a central computer . . ." Opinion, ¶ 15 (emphasis added). The Bureau defined this class, functionally, as

> "equipment, designed from their inception to be used and marketed solely for the input, output, formatting and conversion of computer-based data. These devices are not generally intended for, nor indeed capable of, basic terminal-to-terminal transmission of . . . messages. They are intended for either on-site or remote access interaction with a central computer storage and/or processing unit. Some examples of this class of equipment are the IBM 3270, IBM 3735, Incoterm SPD 10/20, COMPUTEK Series 2000." Opinion, ¶ 14.

The Bureau also pointed to the fact, not disputed, that the DATASPEEED 40/4 "was developed to be marketed for use in conjunction with an IBM 360 computer or other large computer system (*id*. at ¶ 17), and that none of the termirals with which the DATASPEED 40/4 is interchangeable "have been alleged to be communications devices." (*Ibid*.) Thus, it is clear that the Bureau considered the functional role of the DATASPEED 40/4 in reaching the determination that its primary purpose is to perform the input/output functions in a data processing system.

B. The Functions Performed by Earlier Teletypewriters Are Not Relevant.

As has been noted above, the functional analysis urged by AT&T and compelled by the Rules rebuts AT&T's claim that the DATASPEED 40/4 may be offered on a tariffed basis. Notwithstanding the result of this analysis, AT&T claims that the Commission must permit its new offering to be tariffed because it "is in fact a development of teletypewriter service, which has long been held to be a Communications service." (Application at 13.)

The design or use of AT&T's teletypewriters is not relevant to consideration of the instant petition. Many of AT&T's teletypewriters were offered prior to the time that computers were even in existence. As more and more computers were sold, the use of teletypewriters as computer input/output devices steadily increased. Notwithstanding the additional use to which teletypewriters were put, it was and remains true that previous versions of AT&T's teletypewriters could be and were also used for point-to-point communications without involving the use of a computer at all. That alone distinguishes the new DATASPEED 40/4 which is intended only for use as part of a data processing system. Whatever the result might be if the earlier versions of the teletypewriters were now put to the "primary function" test as part of a tariff application, the plain fact is that the new version of the DATASPEED 40 is not tariffable under the Commission's Rules. As the Bureau stated:

> "The marketing data submitted here demonstrates that the synchronous DATASPEED 40 equipment which is part of the present service offering was developed to be marketed for use in conjunction with an IBM 360 computer or other large computer system, and to be a substitute for the IBM 3270 Display Information System and other similar terminals which are typically considered part of the computer systems in which they are used." Opinion, ¶ 17.

The validity of this conclusion is not affected by the fact that, when used at a remote location, the DATASPEED 40/4 transmits data over telephone lines. To the extent that this represents a "communications" function, it is incidental to its primary role as a computer input/output terminal. Indeed, only a very small part of the DATASPEED 40/4 device is specifically designed for transmission of data over common carrier wires. Attachment to telephone lines for remote access requires a slight modification in the control unit of the device as designed for local attachment to a CPU.[1/] Control units such as those used in the IBM 3270 differ in interface logic and data transfer speeds at the point of attachment, but are otherwise identical, and, in any case, the attachment or circuitry is only a small part of the terminal device. While the corresponding small component of the DATASPEED 40/4 enables the data processing device to be used at a remote location over common carrier lines, the primary function of the device remains the same as when similar terminals are connected directly to the CPU. That function is data processing.

Under the functional analysis urged by AT&T, as the Bureau recognized, what is important is not the ancestry of the device, but its present function. From this perspective, the DATASPEED 40/4 device is immediately identifiable as a data processing terminal.

1/ Computer terminal devices are usually designed for both local and remote attachment to a CPU. (Approximately two-thirds of the IBM 3270 terminals are presently used locally, the balance in remote access applications.)

C. The DATASPEED 40/4 Provides Data Processing Rather than Message-Switching Service.

AT&T contends that the DATASPEED 40/4 is not designed primarily as a data processing device because "the content of the message remains unaltered by the DATASPEED 40/4 terminal" (Application at 32), a characteristic AT&T attributes only to message-switching devices. (Application at 15-16.) What AT&T fails to understand is that it is not what happens between the terminal and the CPU that determines whether a service is called "data processing" or "message-switching" under the Commission's Rules, but rather what the CPU does with the data it receives. This is clear from the Commission's discussion in its Computer Inquiry:

> "[M]essage-switching is, in essence, an operation which is inherent in the process of transmitting, by wire or radio, intelligence or data from point of origin to point of destination. As in the case of remote access data processing, user terminals are linked to the central computer by communications channels. Thus, it is possible for users not only to have on-line communication with the computer for data processing purposes, but it is also possible for such users to have the means of communicating with each other when the computer is programmed to switch messages of one to another. Unlike data processing, however, the computer, when and if used for message-switching, does not alter the content of the intelligence transmitted. It simply performs the function of storage and either immediate or delayed forwarding of the message to its addressed destination. In this respect the computer takes the place of the manual or electro-mechanical switching

> or relay operations which are typically involved in the transmission of intelligence for hire by communications common carriers." Tentative Decision, supra p. 8 n.1, 28 F.C.C.2d at 304-305. (Emphasis added.)

The fallacy in AT&T's position is exposed by the fact that most input/output terminals, whether or not connected to a CPU over common carrier lines, transmit the content of the input message unaltered. The key to whether the computer service being performed is deemed to be message-switching or data processing is whether the computer then transmits the message unaltered to a second point, or whether it then acts upon the information and "processes it" (e.g., by storing, retrieving, sorting, merging or calculating).

That it is the function performed by the computer as a whole -- input, CPU and output -- that determines whether the service is data processing or message-switching is plain from the Commission's definition of "Remote Access Data Processing":

> "an offering of data processing wherein communications facilities, linking a central computer to remote customer terminals, provide a vehicle for the transmission of data between such computer and customer terminals." Tentative Decision, supra p. 8 n.1, 28 F.C.C.2d at 296.

Under AT&T"s analysis, the provision of "a vehicle for the transmission of data between . . . computer and customer terminals" would constitute a message-switching service regardless of the amount or locus of the data processing performed. But where the computer itself performs data processing, it is clear from the Commission's definition that the remote input/output terminal and the transmission of data to the CPU are included as part of the data processing service.

While AT&T does not deny that its information display terminals are intended to be used exclusively for input and output functions in a data processing system, it is, in effect, arguing that devices which perform these functions are not part of the system at all, but rather elements of the "communications" service which furnishes access to the CPU from remote locations. But dispersal of the three data processing functions -- input, processing and output -- does not change the fact that they are all integral parts of the same system.

Although the input and output functions of a data processing system can be incorporated in the same device as the processing function,[1] in many computer data processing systems, input and output functions are provided in separate devices. In some configurations of data processing systems, the input/output devices are nearby the CPU and attached to it by electric cables. In other configurations, the input and output devices of the system are placed at remote locations -- on another floor of a building or many miles away. While communications lines may replace the electric cables, the basic data processing functions performed by the input/output devices, without which the computer system cannot operate, are the same whether located in the same room as the CPU, or 1,000 miles away. The fact that communications lines are used in remote access data processing systems does not convert the remote access data processing function to a communications function any more than distributing the switching function provided by a Centrex service in a telephone company central office to a remote private branch exchange on the customer's premises alters the character of the switching function.

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[1] An adding machine can be thought of as a small data processing system in which the input and output functions of the system are incorporated in the same device as the processing function. The operator of the adding machine uses the keyboard to enter the figures to be calculated (the input function), the calculating machinery or electronic circuitry determines the answer (the processing function), and the paper tape provides the answer to the operator (the output function). It is clear that all these functions are part of the same system.

AT&T's contention, therefore, that a data processing terminal becomes a communications device when used remotely, and that carriers must be permitted to tariff as communications services all devices in a data processing system except the CPU, is simply not tenable. It is apparent that the system of which the DATASPEED 40/4 is intended to be a part, and the terminal device itself, perform data processing functions.

II. THE COMPUTER RULES APPLY TO COMPUTER TERMINAL DEVICES, AND THE COMMISSION SHOULD NOT REGULATE SUCH DEVICES.

A. The Rules Are Not Limited to End-to-End Services.

AT&T argues that because, as the Bureau noted, "the Computer Inquiry on its face essentially contemplated the offering of end-to-end data processing services" (Opinion, ¶ 18), the Commission's Rules cannot be applied to an offering of a data processing component. But the Commission's Rules were never intended to apply only to the particular end-to-end computer offerings on the market at the time of their enactment. Declining to formulate specific factual examples of hybrid communications or hybrid data processing services, the Commission said:

> "We believe . . . that in a field as dynamic and innovative as this one, it is not possible to formulate a sufficient number of hypothetical situations which would provide meaningful guidelines . . . . Instead, as we have previously indicated, we believe that guidelines for the industry and the formulation of general principles can best be accomplished by review and evaluation on an ad hoc basis of factual situations as they develop. Under such circumstances we will be reacting to demonstrated needs and will be developing precedents related to the 'real world' in the data/communications field." Final Decision, supra p. 8 n.1, 28 F.C.C.2d at 278-9.

The Commission's intention was to make the Rules flexibly applicable, on a case-by-case basis, to new developments in data processing and communications services. Consistent with this intention, the Bureau reasonably and correctly determined that the DATASPEED 40/4 terminal device was essentially a data processing offering covered by the Rules. As the Bureau explained:

> "At the time [the Computer Inquiry] decision was reached, in 1971, the role of terminal devices in the overall data processing service was considerably less significant than that of the central computer. The remote access terminals then in use were, for the most part, simply devices which had been designed and used for basic communications services, independent of data processing." Opinion, ¶ 11.

But merely because, at that time, terminal devices specifically designed for data processing had not become as important as they are now, it cannot be said that such recent technological developments as the DATASPEED 40/4 or the IBM 3270 are outside the scope of the Rules. The Bureau was clearly correct in concluding that

> "the Commission was clearly concerned with the broader issues of regulated communications services versus non-regulated data processing services, *in toto*. To have held -- as Bell would now have us hold -- that 'data processing' occurs only within the confines of a central computer, and that all associated input/output, conversion, formatting, graphics, and related functions fall within the realm of 'communications services,' would have been untenable." *Id*. at ¶ 12.

B. Declining to Regulate Data Processing Terminals Is Proper Under the Computer Rules and a Valid Exercise of Agency Discretion.

Once the Commission has identified a service as essentially data processing, regulatory forebearance under the Computer Inquiry Rules is completely legitimate and within its discretion. GTE Service Corp. v. F.C.C., 474 F.2d 724 (2d Cir. 1973). Even if the DATASPEED 40/4 device were held to be a common carrier communications service, AT&T's assertion that "[t]he Commission does not have the discretion to choose to regulate or not to regulate such common carrier services" (Application at 12) is plainly wrong. In NARUC v. F.C.C., 525 F.2d 620 (D.C. Cir. 1976), which AT&T cites as authority for its assertion, the Court specifically rejects the holding imputed to it by AT&T:

> "We do not here hold that the Commission is required to exercise its affirmative Title II powers wherever a common carrier within its jurisdiction is found to exist." Id. at 640 n.48.

In fact, the Court suggests that the Commission has "substantial discretion . . . in determining both what and how it can properly regulate." Id. at 638 n.37.[1]

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[1] As the Court recently noted in another case with the same title, NARUC v. F.C.C., No. 75-1075, Slip Opinion at 36 n.113 (D.C. Cir., Feb. 10, 1976),

> "it may be contended and has elsewhere been held, Philadelphia Television Broadcasting Co. v. FCC, 123 U.S. App. D.C. 298, 300, 359 F.2d 282, 284 (1966), that a part of the broad discretion allowed the Commission under the Act involves the power not to exercise particular authority which it has been granted."

The Commission's decision in the Computer Inquiry to forego

> "regulatory authority over data processing services whether or not such services employ communications facilities in order to link the terminals of the subscribers to centralized computers," Tentative Decision, supra p. 8 n.1, 28 F.C.C.2d at 298.

was clearly within its discretion, and the Bureau's action properly followed the Rules enacted in that proceeding.[1]

III. DATA PROCESSING TERMINALS SHOULD NOT, AS A MATTER OF POLICY, BE MARKETED UNDER TARIFF.

It is not only the Computer Rules, but also the policies underlying those rules, which support the Bureau's rejection of AT&T's tariff. In its Computer Inquiry, the Commission decided that (1) it would not be in the public interest to impose tariff regulation on services which have been offered in a highly competitive market on an unregulated basis, and (2) carriers should not be permitted to offer data processing services except through separate subsidiaries.

The Commission, in that Inquiry, outlined its conception of the limits of useful regulation:

> "It appears to us that in reaching a decision as to how we are to exercise our discretion, we should look to the basic purpose of regulatory activity in the context of our general national policy, as well as the specific statutory guidelines given this agency. In

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[1] AT&T does not contend that the Commission, upon finding that a proposed tariff offering violates its Rules, has no authority to reject the tariff. Such authority clearly exists. 47 U.S.C. § 201. See GTE Service Corp. v. F.C.C., supra.

> this country we rely upon the 'free enterprise' system with the maximum possible latitude for individual initiative to enter into any given enterprise and compete for the available business. Our anti-trust laws are designed to prevent restraint of trade. *Government intervention and regulation are limited to those areas where there is a natural monopoly, where economies of scale are of such magnitude as to dictate the need for a regulated monopoly, or where such other factors are present to require governmental intervention to protect the public interest because a potential for unfair practices exists*." Tentative Decision, *supra* p. 8 n.1, 28 F.C.C.2d at 297. (Emphasis added.)

Where, in contrast to these areas of natural monopoly, an industry is effectively and efficiently operating competitively, the Commission has wisely recognized that the umbrella of regulation distorts free competition and inhibits both technological development and consumer choice. In its Computer Inquiry, the Commission determined that the data processing services field was healthily competitive and that, while carriers should not be precluded from entering that field, tariff regulation would be inappropriate:

> "In view of all of the foregoing evidence of an effective competitive situation, we see no need to assert regulatory authority over data processing services whether or not such services employ communications facilities in order to link the terminals of the subscribers to centralized computers. We believe the market for these services will continue to burgeon and flourish best in the existing competitive environment.
>
> "We expect the competitive environment within which data processing services are now being offered to result in substantial public benefit by making available to the public at reasonable charges, a wider range of existing and new data processing services. We believe that these expectations will continue to be realized

> in the free give-and-take of the marketplace without the need for, and possible burden of rules, regulations and licensing requirements." Tentative Decision, supra p. 8 n.1, 28 F.C.C. 2d at 298. (Emphasis added.) 1/

Of course, the market for data processing terminal equipment is diverse and competitive. As is the case with end-to-end data processing services, there is no "natural monopoly" for such equipment, and price and supply are regulated efficiently by the market. As the Commission recognized, regulation of such a competitive market will have predictable results:

> "In this instance, we believe that the imposition of regulatory constraints over what is clearly a data processing hybrid offering, even though it contains communications elements which are an integral part of and an incidental feature thereof, would tend to inhibit flexibility in the development and dissemination of such valuable offerings and thus would be contrary to the public interest. In essence, we recognize no overriding public interest requirement at this time to regulate a service which, due to its nature, except for incidental and peripheral communication elements, is appropriately offered in the existing competitive environment. Final Decision, supra p. 8 n.1, 28 F.C.C.2d 267, 278. (Emphasis added.)

It is no solution to these problems, of course, to allow one segment of a competitive industry -- in this case, AT&T -- to offer equipment under tariff, while the remainder of the industry offers the same equipment without regulation. AT&T itself has conceded, in a previous filing, that competition in the same field, where "some competitors are

---

1/ Cf. Telerent Leasing Corp. et al., 45 F.C.C.2d 204, 223 (1974), aff'd sub nom. North Carolina Utilities Commission v. F.C.C., No. 74-1220 (4th Cir. April 14, 1976).

regulated and others are not" is undesirable.[1] Indeed, such a policy would [illegible] only restrain competition and limit technological deve[illegible], but could also shift to the users of communications services the costs of developing and marketing its data processing terminals.

For these reasons, the Commission developed rules designed to assure that any offering of data processing services by carriers not only will be untariffed, but also will be offered by separate, affilitated entities. Both the Rules and the considerations that underlie them require that any provision by carriers of devices like the proposed DATASPEED 40, which are essentially identical to data processing equipment provided by others in the open market, be provided in that same market, free of tariffs and distinct from the regulated services provided by the carriers.

The Bureau understood that the policies of the Computer Inquiry apply as well to carrier provision of data processing components as to sale of end-to-end services. It correctly concluded "that the [DATASPEED 40] offering is inconsistent with both the rules and policies established in the Computer Inquiry and is unlawful on its face."

---

[1] AT&T Opposition to Petitions to Reject, Jan. 9, 1976, at 16 n. Indeed, AT&T has stated that, as an alternative to unregulated competition or regulated monopoly, "regulated competition" represents "the worst of both worlds." Response of the Bell System Companies (Docket No. 20003), Exhibit 22, "Economic Problem of Regulated Competition," at 32 (April 21, 1975).

Opinion, ¶ 20. There is no basis in the Rules or in sound policy for permitting the regulated offering of the proposed DATASPEED 40, when the unregulated marketplace for similar data processing devices is operating efficiently and competitively.

Conclusion

For the foregoing reasons, the Commission should affirm the decision of the Common Carrier Bureau, and reject AT&T's DATASPEED 40/4 tariff. Such rejection should be without prejudice to the furnishing by AT&T of DATASPEED 40/4 devices on an unregulated basis through a subsidiary in a manner consistent with the rules and policies established in the Computer Inquiry as to the furnishing of data processing devices by other communications carriers.

If the Commission should decide to review the decision of the Bureau, we request that the matter be set for oral argument before the Commission en banc.

Respectfully submitted,

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ATTACHMENT A

RULES — Section 64.702

§ 64.702 Furnishing of data processing services.

(a) For the purpose of this subpart—

(1) "Data processing" is the use of a computer for the processing of information as distinguished from circuit or message-switching. "Processing" involves the use of the computer for operations which include, *inter alia*, the functions of storing, retrieving, sorting, merging, and calculating data, according to programed instructions.

(2) "Message-switching" is the computer-controlled transmission of messages, between two or more points, via communications facilities, wherein the content of the message remains unaltered.

(3) "Local data processing service" is an offering of data processing wherein communications facilities are not involved in serving the customer.

(4) "Remote access data processing service" is an offering of data processing wherein communications facilities, linking a central computer to remote customer terminals, provide a vehicle for the transmission of data between such computer and customer terminals.

(5) "Hybrid service" is an offering of service which combines remote access data processing and message-switching to form a single integrated service.

(i) "Hybrid data processing service" is a hybrid service offering wherein the message-switching capability is incidental to the data processing function or purpose.

(ii) "Hybrid communication service" is a hybrid service offering wherein the data processing capability is incidental to the message-switching function or purpose.

(b) Except as provided herein, no common carrier subject, in whole or in part, to the Communications Act shall engage directly or indirectly in furnishing data processing service to others except as expressly provided in paragraph (c) of this section. This prohibition shall apply to all communications common carriers, including section 2(b)(2) carriers, where any carrier itself has annual operating revenues exceeding $1 million or any such carrier is directly or indirectly controlled by, or is under common control with, another carrier or carriers, and the combined annual revenues of all such carriers exceed $1 million.

(c) Except for companies of the Bell System, common carriers may, subject to other provisions of law, have a controlling or lesser interest in, or be under common control with, a separate corporate entity that furnishes data processing service to others provided the following conditions are met:

(1) Each such separate corporation must maintain its own books of account, have separate officers, utilize separate operating personnel, and utilize computing equipment and facilities separate from those of the carrier for its data processing service offerings.

(2) Each such common carrier shall file with the Commission a complete statement of the terms and conditions of every written or oral contract, agreement, or other arrangement entered into between such carrier and any such separate corporation within 30 days after the contract, agreement, or other arrangement is made.

(3) No such common carrier subject to the prohibition of paragraph (b) of this section shall engage in the sale or promotion of data processing services on behalf of any such separate corporation.

(d) No common carrier subject in whole or in part to the Communications Act of 1934, as amended, shall sell, lease, or otherwise make available to any other entity any capacity or computer system component on its computer system or systems which that carrier uses in any way for the provision of its common carrier communications services.

(e) Any common carrier intending to file a tariff respecting a service offering which it considers to be a hybrid communication service shall, at least 90 days prior to the intended effective date of such tariff, submit to the Commission a complete description of the service, along with a statement of its reasons for concluding that the proposed service is a hybrid communications service. Whereupon:

(1) If, at the end of 60 days after such notice is filed with the Commission, the Commission has not advised the carrier of contrary findings respecting its proposed hybrid communication service, the carrier may proceed to file appropriate tariffs in accordance with applicable provisions of the Commission's rules; or

(2) If the carrier is advised within 60 days after the Commission's receipt of notice that the Commission has tentatively concluded that the proposed offering is not a hybrid communication service, the carrier may seek reconsideration of the tentative conclusion, request a hearing on any disputed factual findings or pursue such other remedies as are provided by law.

(f) Before a common carrier may provide its data processing affiliate with communication services and facilities which the latter desires to use for the furnishing of any hybrid data processing service, the carrier shall first submit, directly or through its affiliate, a complete description of the proposed service offering, along with a statement of the reasons for concluding that the service is a hybrid data processing service. The carrier may provide such service unless, within 30 days from the receipt of such notice, the Commission shall have advised the carrier or its affiliate of the Commission's tentative conclusion that the intended service is a communications service. If the carrier and its affiliate disagree therewith, the carrier may seek reconsideration of the tentative conclusion, request a hearing on any disputed factual findings or pursue such other remedies as are provided by law.

(g) No common carrier providing a communication service, hybrid or otherwise, may discontinue such tariffed service until authorization to do so is obtained from the Commission. In seeking authorization to discontinue a service, a carrier must:

(1) Demonstrate that neither the present nor future public convenience and necessity will be adversely affected by the discontinuance. Such demonstration shall include whether and to what extent there is a demand for the communication service, the entity or entities which would continue to provide such service if discontinued by the carrier, and the comments of existing customers on any proposed modification of the service and its offering by a carrier's data processing affiliate;

(2) Demonstrate the nature and extent of the public demand for any modified service proposed to be rendered as a hybrid data processing service; and

(3) Submit full information as to the disposition of any of the facilities used in the communication service, including relevant financial arrangements, the accounting to be performed by the carrier with respect to the transaction, and the treatment of any losses sustained in the provision of the communication service.
[38 FR 8745, Apr. 6, 1973]

Attachment B is the Orange Booklet

That Follows the Certificate of Service

CERTIFICATE OF SERVICE

I, Erlinda E. Casey, hereby certify that on this 30th day of April 1976, copies of the foregoing Opposition of International Business Machines Corporation to Application for Review and associated attachments were served by mail, postage prepaid, on the following persons at the addresses shown below:

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Attachment B
to IBM Opposition
April 30, 1976

GA27-2739-6
File No. S360/S370/S3-09

Systems

An Introduction to the IBM 3270 Information Display System

IBM

00789

GA27-2739-6
File No. S360/S370/S3-09

Systems

An Introduction to the IBM 3270 Information Display System

IBM

CC770

Preface

This publication provides customer executives, installation managers and planners, and IBM marketing representatives with planning information about the IBM 3270 Information Display System. The 3270 display system comprises the following units:

- 3271 Control Unit, Models 1 and 2 (BSC application)
- 3271 Control Unit, Models 11 and 12 (SDLC application)
- 3272 Control Unit, Models 1 and 2
- 3275 Display Station, Models 1 and 2 (BSC application)
- 3275 Display Station, Models 11 and 12 (SDLC application)
- 3277 Display Station, Models 1 and 2
- 3284 Printer, Models 1, 2, and 3
- 3286 Printer, Models 1 and 2
- 3288 Line Printer, Model 2

The 3270 display system is offered with the following programming support:

- BTAM under DOS and OS (MFT, MVT, and VS)
- TCAM under OS and OS/VS
- VTAM under OS/VS and DOS/VS
- Virtual Machine Facility/370 (VM/370)
- DIDOCS and SDS under OS
- VIDEO/370 under DOS and OS (MFT and MVT)
- VIDEO/370 under CICS
- DATA/360 under DOS and OS (MFT and MVT)
- IMS under OS
- CICS under DOS and OS
- IQF under DOS and OS
- TSO under OS
- VSPC under OS/VS and DOS/VS
- VSAPL under VM/370 CMS

Check with the IBM marketing representative for details about the programming support that is applicable to remote 3270 systems when they are operating in BSC or SDLC line discipline.

This book is divided into ten chapters. Chapter 1 provides an introduction to the 3270 display system, highlighting the most important aspects of the product. Chapter 2 is concerned with configuring applications-oriented display systems and also describes the many special features available to expand performance. Appendixes A and B support this chapter by providing a configurator and a features list, respectively. Chapter 3 highlights the functional capabilities of the display system. Chapter 4 discusses types of applications that can be served by the 3270 display system. Chapter 5 describes highlights of the programming support, and Chapter 6 cites programming considerations for converting from an IBM 2260/2848 or an IBM 2265/2845 display system to a 3270 display system. Chapters 7 through 10 provide descriptions of human factors considerations, installation planning, reliability and availability, and performance considerations, respectively.

The book assumes that a reader has a basic understanding of display systems and their relationship to a central processor. Someone reading those chapters related to programming is expected to have an understanding of an operating system and applications-related display system programming support. Chapter 5, Programming Support, and Chapter 8, Installation Planning, provide references to other IBM documentation for additional information on their respective subjects.

A more detailed description of the 3270 Information Display System may be found in *IBM 3270 Information Display System Component Description*, GA27-2749.

Seventh Edition (October, 1975)

This edition is a major revision of and obsoletes GA27-2739-5. A description of the Data Analysis – APL special feature has been added. In addition, minor changes and corrections have been made throughout the manual. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

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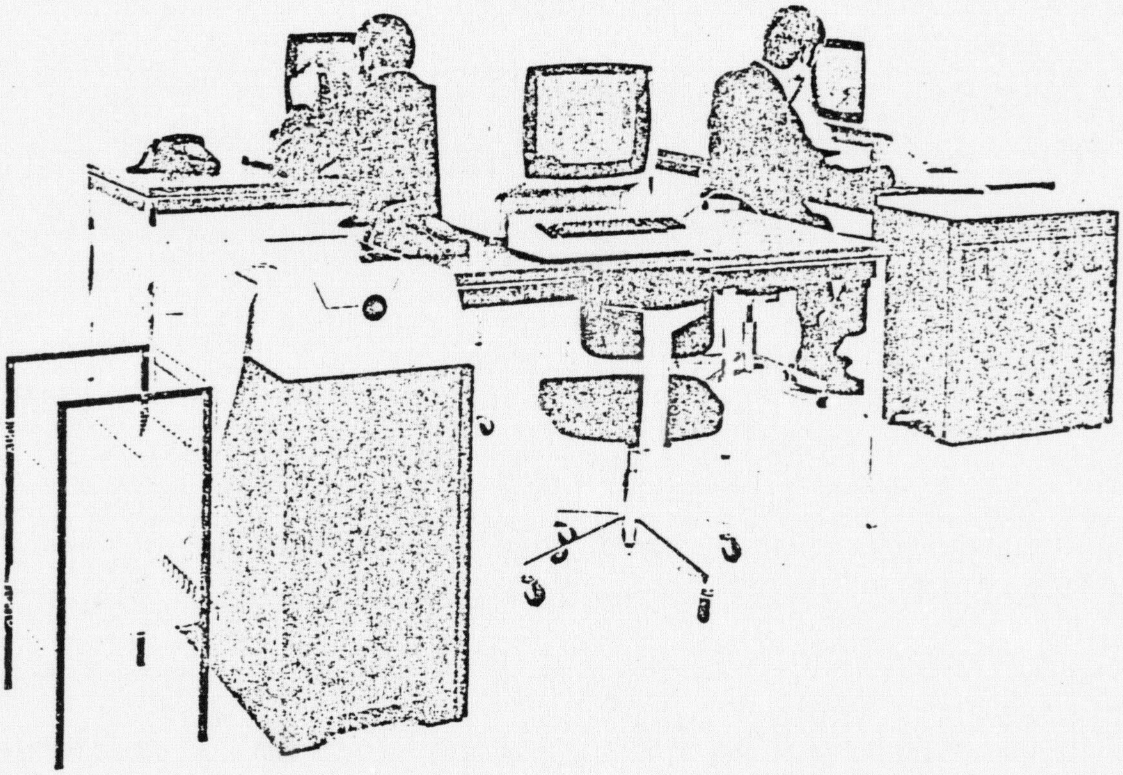
Abbreviations

ASCII	American National Standard Code for Information Interchange
BDAM	Basic Direct Access Method
bps	bits per second
BSAM	Basic Sequential Access Method
BSC	binary synchronous communications
BTAM	Basic Telecommunications Access Method
CE	customer engineer
CICS	Customer Information Control System
CPU	central processing unit
CRT	cathode-ray tube
DAA	data access arrangement
DAM	Direct Access Method
DCM	display control module
DIDOCS	Device Independent Display Operator Console Support
DOS	Disk Operating System
EBCDIC	Extended Binary-Coded-Decimal Interchange Code
FE	Field Engineering
FRU	field replaceable unit
GAM	Graphic Access Method
IMS	Information Management System
IQF	Interactive Query Facility
ISAM	Indexed Sequential Access Method
JCL	job control language
MCS	multiple console support
MFT	multiprogramming with a fixed number of tasks
MVT	multiprogramming with a variable number of tasks
NCP	network control program
OLT	online test
OS	Operating System
PFK	program function key
QSAM	Queued Sequential Access Method
RFT	request for test
SAM	Sequential Access Method
SDLC	synchronous data link control
SDS	Status Display Support
TCAM	Telecommunications Access Method
TCU	transmission control unit
TPTC	Teleprocessing Test Center
TSO	Time Sharing Option
VS	virtual storage
VSPC	Virtual Storage Personal Computing
VTAM	Virtual Telecommunications Access Method



Frontispiece. A 3270 Information Display System (Design Model)

Chapter 1. Introduction

The IBM 3270 Information Display System is a new family of display products that can significantly reduce total display system cost through:

- Configuration and feature flexibility.
- Advanced hardware, programming, and operator capabilities.
- Increased reliability and availability.

The 3270 display system can be tailored to meet the needs of all alphameric display applications. It sets a new standard for display system price/performance by offering improved response times and transaction rates based on increased transmission and operator efficiency. In addition, the 3270 display system is easy to operate and well suited to an office environment.

CONFIGURATION AND FEATURES

The 3270 display system has outstanding configuration flexibility:

- It can be a standalone unit, a small cluster, or a large cluster (of up to 32 units).
- It can include 480-character display stations (Figure 1-1) or large-capacity 1920-character display stations (Figure 1-2) or both.
- It can also include printers (40 or 66 characters per second).
- It can be attached locally (directly to the channel) or remotely via BSC or SDLC line discipline (through communications facilities).
- It allows more display stations to be attached to each communications line and is compatible with other BSC or SDLC devices.

The 3270 display system also has exceptional feature flexibility:

- It offers typewriter, data entry, and operator console keyboards and a selector pen.
- It provides local data transfer rates of up to 650,000 characters per second and remote line speeds of up to 7200 bits per second (using a modem such as the IBM 3875 Modem).
- It includes data security enhancement features, such as a key lock, an operator identification card reader, and the ability to enter data without it being displayed.
- Its versatility is further enhanced by the addition of the Data Analysis - APL Feature, which provides users with a full, interactive APL computing capability.

For details about configurations and features, see Chapter 2.

FUNCTIONAL CAPABILITIES

The advanced capabilities of the 3270 display system include:

- Hardware capabilities for data compaction (which reduces the number of characters that have to be transmitted) to improve response time by increasing transmission efficiency.
- Programming capabilities for screen formatting and operator capabilities for screen editing to improve transaction rates by increasing operator efficiency.

Chapter 3 describes functional capabilities of the 3270 display system; performance considerations are described in Chapter 10.

APPLICATIONS, PROGRAMMING SUPPORT, CONVERSION

The 3270 display system is designed for the whole range of alphameric display applications, including simple, interactive, or complex inquiry applications, data or order entry applications, and system console applications. Chapter 4 contains a survey of applications and a description of advantages and highlights of the 3270 display system in relation to these applications.

Programming support for the 3270 display system includes:

- Basic Telecommunications Access Method (BTAM), under both the Disk Operating System and the Operating System.
- Telecommunications Access Method (TCAM) under the Operating System.
- Virtual Telecommunications Access Method (VTAM) under OS/VS and DOS/VS.
- Display console (DIDOCS) and status display (SDS) under the System/360 Operating System for using the local 3270 display system as a system console to control a system and to present status displays.
- VIDEO/370, under both the Operating System and the Disk Operating System, on either System/360 or System/370, for using the 3277/3275 display for data entry and verification in local and remote environments.
- DATA/360, under both the Operating System and the Disk Operating System, on either System/360 or System/370, for using the 3277 in 2260 mode for data entry and verification.

- Information Management System (IMS), under the Operating System, on either System/360 or System/370, for using the 3270 Information Display System for data base or data communication applications.
- Interactive Query Facility (IQF) for IMS, under both the Disk Operating System and the Operating System, for using the 3270 system for terminal-oriented query applications.
- Customer Information Control System (CICS), under both the Disk Operating System and Operating System, for using the 3270 Information Display System for data base or data communication and applications.
- Time Sharing Option (TSO) under the Operating System, under both System/360 and System/370, for terminal-oriented time-sharing applications.
- Virtual Storage Personal Computing (VSPC) under OS/VS and DOS/VS for APL and other interactive applications.
- Virtual Storage APL (VSAPL) under VM/370 for APL applications.

Chapter 5 discusses the programming support. Check with the IBM marketing representative to determine which programming support is applicable to remote display systems that use BSC or SDLC line discipline.

For information about converting from IBM 2260/2848 or IBM 2265/2845 display systems to 3270 display systems, see Chapter 6.

RELIABILITY AND AVAILABILITY

The 3270 display system provides customers with much higher reliability and availability:

- The latest solid-state components ensure extremely reliable character generation and image control and regeneration.
- The decentralized design, which places more circuitry in the display station and less in the control unit, minimizes the failure of one unit from affecting the availability of the rest of the display system.

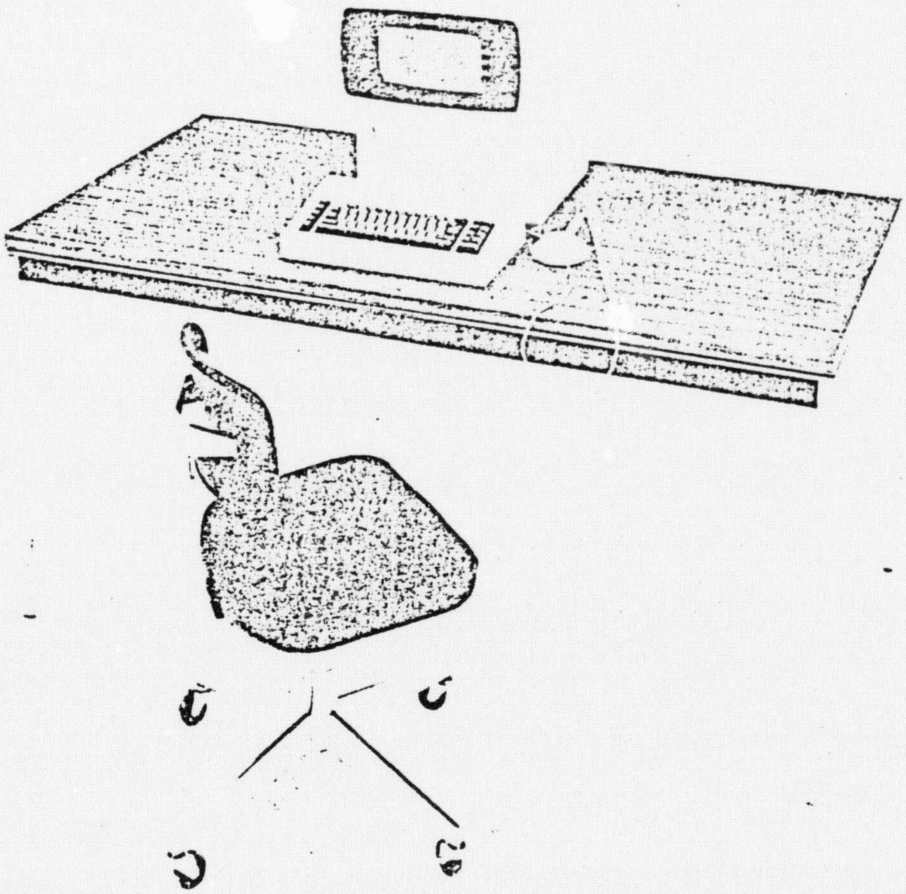


Figure 1-1. 3277 Display Station, Model 1 (Design Model)

Chapter 9 gives more information on reliability and availability.

HUMAN FACTORS AND INSTALLATION PLANNING

The 3270 display system has been carefully designed with human factors and installation planning considerations in mind:

- The display image is of a high quality in terms of clarity, stability, and brightness.
- The display stations are easy to operate: features such as movable keyboards with layouts familiar to typists, data entry operators, or system operators contribute to maximum operator efficiency with minimum retraining.
- The display systems are easy to install in a normal office or computer room environment: the units are comparatively small in size and light in weight and do not require air conditioning.

For details about human factors and installation planning, see Chapters 7 and 8, respectively.

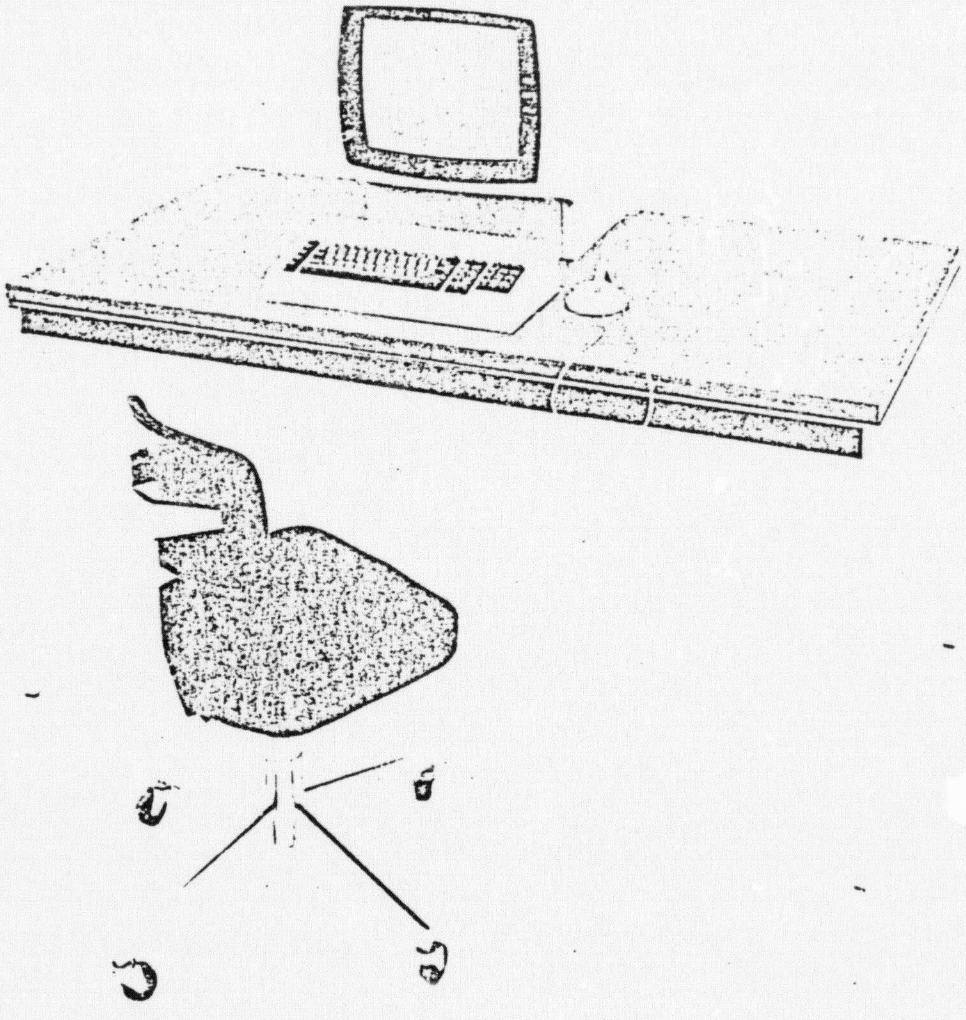


Figure 1-2. 3277 Display Station, Model 2 (Design Model)

Chapter 2. Display System Units and Features

INTRODUCTION

The 3270 family of display system products was described in the previous chapter as being flexible. Flexibility includes the ability to configure a variety of display systems from one basic group of IBM units:

3271 Control Unit

- Models 1 and 11 - 480 character buffer capacity.
- Models 2 and 12 - 1920 character buffer capacity.
- Models 1 and [illegible] to a System/360 or System/370 via modems and a binary synchronous communications (BSC) data link; and operate with any of the following: an IBM 2701 Data Adapter Unit, an IBM 2703 Transmission Control Unit, an Integrated Communications Adapter, or an IBM 3705 Communications Controller.
- Models 1 and 2 attach to System/3 Model 10 via a System/3 Binary Synchronous Communications Adapter or to System/3 Model 15 via the Local Communications Adapter.
- Models 11 and 12 attach to a System/370 via modems and a synchronous data link control (SDLC) communications link; and operate in Network Control Program (NCP) mode with an IBM 3704 or 3705 Communications Controller.

3272 Control Unit

- Model 1 - 480 character buffer capacity.
- Model 2 - 1920 character buffer capacity.
- Attaches to a System/360 or System/370 via a selector, multiplexer, or block multiplexer channel.

3275 Display Station

- Models 1 and 11 - 480 character buffer capacity.
- Models 2 and 12 - 1920 character buffer capacity.
- Models 1 and 2 - Standalone units that attach to a System/360 or System/370, via modems or data access arrangements (DAA) and any of the following: an IBM 2701, an IBM 2703, an Integrated Communications Adapter, or an IBM 3705 Communications Controller.
- Models 1 and 2 - Attach to System/3 Model 10 or 15 via a Binary Synchronous Communications Adapter or via the Local Communications Adapter.
- Models 11 and 12 - Attach to System/370 via modems and a synchronous data link control (SDLC) communications link; and operate in NCP mode with a 3704 or 3705 Communications Controller.

3277 Display Station

- Model 1 - 480 character display image.
- Model 2 - 1920 character display image.
- Model 1 attaches to a 3271 control unit (all models) or to a 3272 control unit, model 1 or 2.
- Model 2 attaches to a 3271 control unit, model 2 or 12, or to a 3272 control unit, model 2.

3284 Printer

- Model 1 - 480 character buffer capacity with a 40-cps printout rate.
- Model 1 attaches to a 3271 or a 3272 control unit (all models).
- Model 2 - 1920 character buffer capacity with a 40-cps printout rate.
- Model 2 attaches to a 3271 model 2 or 12 or to a 3272 control unit, model 2.
- Model 3 - no buffer is provided; the printout rate is 40 cps.
- Model 3 attaches to a 3275 display station (all models).

3286 Printer

- Model 1 - 480 character buffer capacity with a 66-cps printout rate.
- Model 1 attaches to a 3271 or a 3272 control unit (all models).
- Model 2 - 1920 character buffer capacity with a 66-cps printout rate.
- Model 2 attaches to a 3271, model 2 or 12, or to a 3272 control unit, model 2.

3288 Line Printer (Model 2 only)

- Model 2 - 1920 character buffer capacity. The print rate is 120 lines per minute.
- Model 2 attaches to a 3271 control unit model 2 or 12, or a 3272 control unit, model 2.

SYSTEM ATTACHMENT

A 3270 display system, configured from the list of units just introduced, can be one that fits the needs of most applications.

A 3270 system may attach locally or remotely to a host system. Local (direct) attachment requires a cable to connect the 3270 system to the host system. Remote attachment employs common carrier (or equivalent customer) facilities of unlimited length to communicate between the host and the 3270 system.

Two types of remote attachment are available, depending upon the remote operating mode line discipline that is selected: binary synchronous communication (BSC) data link mode or synchronous data link control (SDLC) operating mode.

The flexibility of configuring the display system is further enhanced by the number of IBM host systems with which it can be operated. Host systems that can operate with 3270 display systems when locally attached or remotely attached, using BSC operating mode, are:

1. System/360 Models 25, 30, 40, 50, 65, 67*, 75, 85, and 195.
2. System/370 Models 115, 125, 135, 145, 155, 158, 165, 168, and 195.
3. System/3 Models 10 and 15.

3270 display systems that operate via the SDLC operating mode can be attached to the following host systems:

System/370 Models 115, 125, 135, 145, 155-II, 158, 158 MP, 165-II, 168, and 168 MP.

The following paragraphs describe local and remote attachment as an aid to configuration planning.

Local Attachment

Local (direct) attachment of a 3272 control unit, model 1 or 2, to a System/360 or System/370 is through a selector, multiplexer, or block multiplexer channel (Figure 2-1); the control unit attaches via one of the eight control unit positions on the channel interface. The channel provides the control unit with data that is to be displayed, and with control information that is needed to direct the operation of the display station or printer controller that may be attached to the control unit. Buffer storage in the devices (display station or printer) stores digitally coded data from the control unit for display or printing. The buffer permits simultaneous display image presentation and message composition from a keyboard at each display station.

The 3272 control unit, model 1, can direct the operation of up to 32 attached:

- 3277 display stations, model 1.
- 3284 printers, model 1.
- 3286 printers, model 1.

The 3272 control unit, model 2, can direct the operation of up to 32 attached:

- 3277 display stations, model 1 or 2.
- 3284 printers, model 1 or 2.
- 3286 printers, model 1 or 2.
- 3288 line printers, model 2.

At least one display station with a keyboard must be attached to any control unit (Figure 2-1).

Locally attached control units can be positioned up to 200 feet from the system channel, depending upon system and channel configuration. Each attached device can operate up to 2000 feet from a control unit, allowing computer access from a display operator's normal working area. Sharing of the control unit by several devices results in economical configurations.

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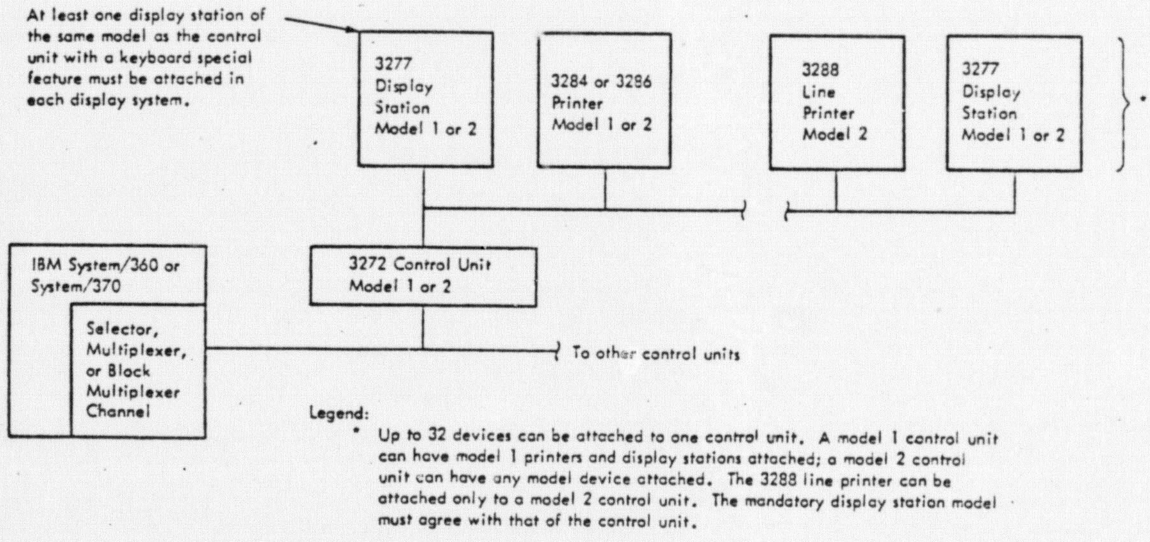
*The System/360 Operating System (OS) will support attachment in 65 mode only.


At least one display station of the same model as the control unit with a keyboard special feature must be attached in each display system.
3277 Display Station Model 1 or 2
3284 or 3286 Printer Model 1 or 2
3288 Line Printer Model 2
3277 Display Station Model 1 or 2
*
IBM System/360 or System/370
Selector, Multiplexer, or Block Multiplexer Channel
3272 Control Unit Model 1 or 2
To other control units

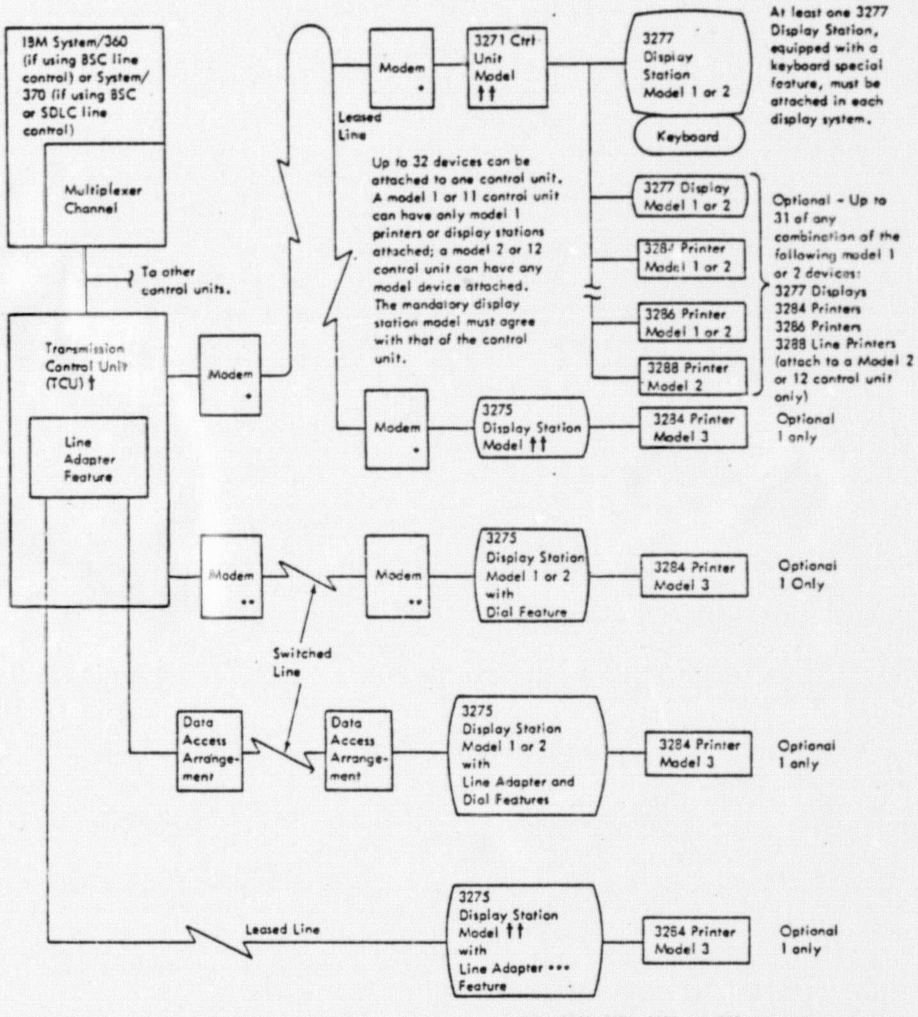
Legend:

* Up to 32 devices can be attached to one control unit. A model 1 control unit can have model 1 printers and display stations attached; a model 2 control unit can have any model device attached. The 3288 line printer can be attached only to a model 2 control unit. The mandatory display station model must agree with that of the control unit.

Figure 2-1. Locally Attached 3270 Display System

Remote Attachment

Remote attachment (Figure 2-2) differs from local attachment in the medium through which the control unit and system channel communicate. In a local configuration, the control unit is cabled directly to the system channel. In a remote configuration, a transmission control unit (TCU), an integrated communications adapter, or a communications controller is cabled locally to the system channel. Display data and control information is relayed from the system channel to a control unit by a TCU, an integrated communications adapter, or a communications controller in binary synchronous communications (BSC) mode of operation, or by using a communications controller in synchronous data link control (SDLC) operating mode. The


IBM System/360 (if using BSC line control) or System/370 (if using BSC or SDLC line control)
Multiplexer Channel
To other control units.
Transmission Control Unit (TCU) †
Line Adapter Feature
Modem *
Leased Line
3271 Ctrl Unit Model ††
3277 Display Station Model 1 or 2
Keyboard
At least one 3277 Display Station, equipped with a keyboard special feature, must be attached in each display system.
Up to 32 devices can be attached to one control unit. A model 1 or 11 control unit can have only model 1 printers or display stations attached; a model 2 or 12 control unit can have any model device attached. The mandatory display station model must agree with that of the control unit.
3277 Display Model 1 or 2
3284 Printer Model 1 or 2
3286 Printer Model 1 or 2
3288 Printer Model 2
Optional - Up to 31 of any combination of the following model 1 or 2 devices: 3277 Displays 3284 Printers 3286 Printers 3288 Line Printers (attach to a Model 2 or 12 control unit only)
Modem *
3275 Display Station Model ††
3284 Printer Model 3
Optional 1 only
Modem **
Modem **
3275 Display Station Model 1 or 2 with Dial Feature
3284 Printer Model 3
Optional 1 Only
Switched Line
Data Access Arrangement
Data Access Arrangement
3275 Display Station Model 1 or 2 with Line Adapter and Dial Features
3284 Printer Model 3
Optional 1 only
Leased Line
3275 Display Station Model †† with Line Adapter *** Feature
3284 Printer Model 3
Optional 1 only

†2701 Data Adapter Unit, 2703 Transmission Control (leased line, with external modem only), 3705 Communications Controller, or equivalent Integrated Communication Adapter. Additionally, the 3705 Communications Controller attaches to a selector or block multiplexer channel. Using BSC mode, the choice of unit is dependent upon the processing system model, the type of channel, and the communication network selected. A 3704 or 3705 Communications Controller is required when using SDLC mode of operation.

††3271 Control Unit, Model 1 or 2, and 3275 Display Station, Model 1 or 2, are required for BSC operation. 3271 Control Unit, Model 11 or 12 and 3275 Display Station, Model 11 or 12, are required when using the SDLC operating mode.

*IBM 3872, 3874, 3875, or 4872 Modems (or equivalent), as required. When switched network backup capability is provided, an IBM 3872, 3874, or 3875 modem is used, with a dial telephone attached, to communicate with the transmission control unit.

**1200-bps operation only.

***1200-bps operation only, on leased line.

Figure 2-2. Remotely Attached 3270 Display System

communications facilities consist of modems and common carrier leased* voice grade channels or the customer's own equivalent facilities (telephone lines, microwave transmission, or satellite).

Remote Attachment for BSC Operating Mode

When employing BSC operating mode to communicate with a host System/360 or System/370, a 3270 display system can be remotely attached to the teleprocessing network with a 3271 control unit, model 1 or 2, or with a 3275 display station, model 1 or 2. Depending upon the host system and channel selected, a 2701 data adapter unit, 2703 transmission control unit, or 3705 communications controller connects the teleprocessing network to the host system channel.

The 3271 control unit model 1 can attach up to 32:

- 3277 display stations, model 1.
- 3284 printers, model 1.
- 3286 printers, model 1.

The 3271 control unit model 2 can communicate with up to 32 attached:

- 3277 display stations, model 1 or 2.
- 3284 printers, model 1 or 2.
- 3286 printers, model 1 or 2.
- 3288 line printers, model 2.

As in local configurations, at least one display station with a keyboard must attach to any control unit.

A standalone remote display system, the 3275 display station, model 1 or 2, provides added convenience for locations that require a single display device. The 3275 display station does not require a control unit to communicate and is, therefore, more economical than a control unit with a single 3277 display station attached. The 3275 display station unit can be expanded by attaching a 3284 printer, model 3 (Figure 2-3), to provide a paper copy of computer messages. The 3275 display station, model 1 or 2, can be attached (multi-dropped) to the same leased remote communication line as other 3270 display systems and other IBM products that use the BSC mode of operation, or the 3275 can operate on a switched communication line, using the Dial feature.

Remote Attachment for SDLC Operating Mode

A 3270 display system is remotely attached to a host System/370 via a 3271 control unit, model 11 or 12, or a

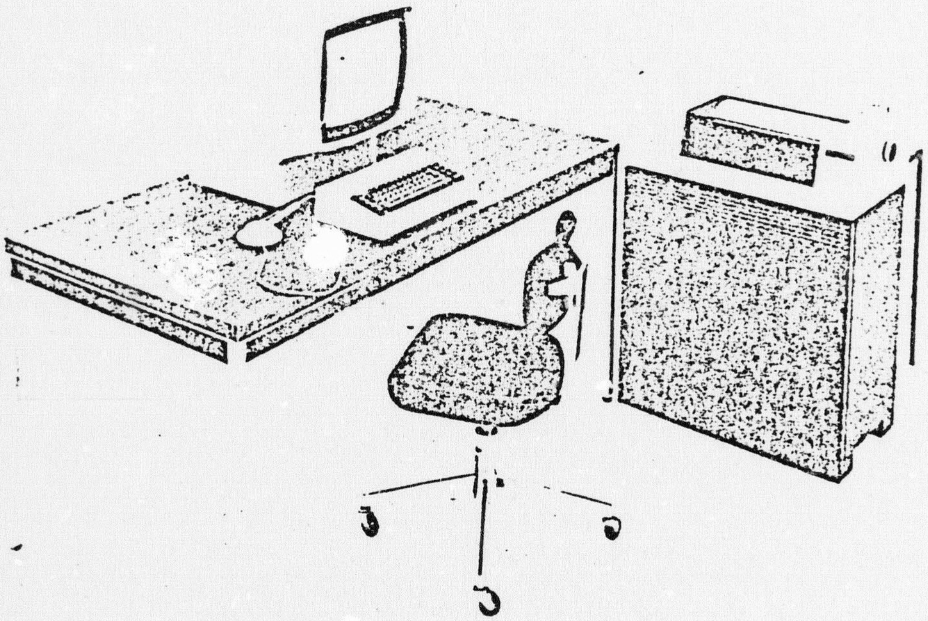


Figure 2-3. 3275 Display Station with 3284 Printer, Model 3 (Design Model)

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*References to the term "leased", used to qualify communication channels or lines, are found within 3270 publications. The term "nonswitched" is a more currently used term that is synonymous with "leased", and is found in publications that describe more recently announced IBM systems which employ SDLC line discipline.

3275 display station, model 11 or 12, over a teleprocessing network that employs SDLC line discipline. This configuration requires a 3704 or 3705 communications controller. The 3704 or 3705 relays the display data and control information from the host system channel to the 3271 or 3275 (model 11 or 12) units in SDLC line discipline, via modems and common carrier leased voice grade lines.

The 3271 control unit, model 11, directs the operation of up to 32 attached:

- 3277 display stations, model 1.
- 3284 printers, model 1.
- 3286 printers, model 1.

The 3271 control unit, model 12, can attach up to 32:

- 3277 display stations, model 1 or 2.
- 3284 printers, model 1 or 2.
- 3286 printers, model 1 or 2.
- 3288 line printers, model 2.

At least one display station with a keyboard must attach to any control unit.

The 3275 display station, model 11 or 12, does not require a control unit for attachment to the leased line teleprocessing network. A 3284 model 3 printer can be attached to the 3275 display station when a paper copy of the computer message is desired. The 3275 display station, model 11 or 12, can be attached to the same leased remote communication line as other 3270 systems and other IBM products that use the SDLC mode of operation.

Teleprocessing Networks and Modems

Remotely attached 3270 display systems that use BSC or SDLC line discipline operate in half-duplex transmission mode on half-duplex or full-duplex communication facilities.

The 3271, model 1 or 2, can attach to a multipoint leased line network. The 3275, model 1 or 2, can operate in multipoint mode on leased lines or on switched network lines when the Dial feature is installed.

The 3271 and 3275, models 11 and 12, can attach to multipoint leased line networks. When two or more SDLC devices are multidropped and attached to a 3704 or 3705 communications controller, messages may be simultaneously transmitted and received by the 3704 or 3705 units on full-duplex facilities (duplex-multipoint operation).

The following IBM modems can be used in remote systems that employ BSC or SDLC line control (as specified in Figure 2-2):

- 3872, model 1 (2400 bps)
- 3874, model 1 (4800 bps)
- 4872, models 1 and 3 (4800 bps)
- 3875, model 1 (7200 bps)

Switched-network backup capability is available when using an IBM 3872, 3874, or 3875 Modem. Switched-network capability provides a dial communications system to replace a failing leased-line network. Installation of the switched-network backup feature ensures minimum interruption of data transfer when a failure or an excessively high error rate occurs on a leased line. In addition, backup capability offers a diagnostic tool for isolating a malfunction to terminal equipment or to the common carrier. Transmission speeds of 1200 or 2400 bps are available, using the IBM 3872 Modem; speeds of 2400 bps are available, using the 3874 Modem; and 1800 or 3600 bps may be obtained, using the IBM 3875 Modem. Switched-network backup operation is initiated by the terminal operator, using a dial telephone. When, for example, excessive trouble is experienced with a leased line, the terminal operator places a call to the TCU or communications controller at a specified time and establishes a connection for operation.

FEATURES

Many features are available for installation on 3270 display system units. The features are described below, and a five-page display system configurator is provided in Appendix A.

Features are categorized as Specify or Special. A Specify (standard) feature is one that must be chosen (at no extra cost) to make a display system functional. A special feature is one that involves extra costs but is not required to make the display system functional; this feature will improve performance, provide additional operational capability, or permit expansion of the display system.

Appendix B lists all features, Specify and Special, now available.

Specify Features

Power

Display stations and printers in the United States all operate with 115V, 60Hz power; control units, however, operate from any one of three different power sources. All units available through the IBM World Trade Corporation can operate from one of several different power sources.

ASCII Transmission Code

This feature is applicable to the 3271 control unit, model 1 or 2, and to the 3275 display station, model 1 or 2, and allows the display station to be attached to central processing systems that communicate via BSC mode in ASCII code. (ASCII, American National Standard Code for Information Interchange, X3.4-1968.)

Monocase Character Generator

Monocase character generators are designed for display stations and printers, and are available for the following countries: United States, Austria, Belgium, Denmark, France, Finland, Germany, Italy, Norway, Portugal (and Portuguese speaking countries), Spain (and Spanish speaking countries), Sweden, and the United Kingdom. Monocase character generators for Belgium, France, and Italy are identical with the United States EBCDIC character generator.

EBCDIC or ASCII Character Set

An EBCDIC or ASCII Character Set must be specified for 3275 and 3277 display stations, and for 3284 and 3286 printers that are employed in a remote configuration using BSC line discipline. An EBCDIC Character Set (Domestic or World Trade), or ASCII Character Set A or ASCII Character Set B is to be specified for the character belt of the 3288 Line Printer.

"X" Error Print

This feature for the 3288 Line Printer allows the insertion of an additional line with an "X" at the end of a printout, when an error has occurred in that printout.

Vertical Forms Control (VFC)

The Vertical Forms Control feature on the 3288 Line Printer allows the forms to advance under program control, after initial presetting of the VFC Selector switches by the operator. The switches can be set for a forms length of 0–99 print lines, and must be set every time a different length form is inserted in the printer.

Pin Feed Platen

This feature is applicable to the 3284 and 3286 printers and allows a choice of 120, 126, or 132 print positions.

Special Features

ASCII Transmission Code

This feature may be installed on the 3271 control unit, model 11 or 12, and the 3275 display station, model 11 or 12, and allows attachment to central processing systems that communicate via SDLC line discipline in ASCII code. (ASCII, American National Standard Code for Information Interchange, X3.4 – 1968.)

Device Adapter

Every control unit has one built-in device adapter. This adapter provides a control unit with the facilities necessary to communicate with, and service up to, four devices (display stations or printers). Since each control unit can operate with up to 32 devices, up to 7 device adapters can be added to a basic control unit.

*1200-bps Transmission Speed**

All models of [illegible] 3271 control unit and 3275 display station can communicate with a central processing unit from a remote location, via communication facilities, at speeds of 1200, 2000, 2400, 4800, or 7200 bps.

At other than 1200-bps rate, the modem must provide the necessary clocking. At the 1200-bps transmission rate, clocking is not provided by the modem. When this situation exists, a 1200-bps transmission speed feature is required to provide the needed clocking.

*4800/7200-bps Transmission Speed**

Installing this feature in a 3271 control unit, model 1 or 2, or a 3275 display station, model 1 or 2, permits operation with communication facilities at speeds of 4800 or 7200 bps.

Dial

This feature enables the 3275 model 1 or 2 operator to establish communication by dialing the telephone number(s) of the processor(s) serving the display station. Similarly, the operator at the remotely located processor(s) may dial the 3275. The dial feature employs switched telephone network lines (instead of permanently attached leased lines). Either EBCDIC or ASCII transmission code may be used, as specified. The BSC point-to-point contention line discipline is employed.

Line Adapter (1200-bps Integrated Modem)

The line adapter is a low-cost telephone line adapter which provides an electrical interface for attaching the 3275 model 1 or 2 that is equipped with the dial feature to common-carrier switched-network lines. Data access arrangements attach the line adapters to the phone lines. A line adapter feature is also available for attachment to the 3275 (all models), allowing 1200-bps operation over leased lines. The line adapter is placed within the 3275. In this environment, the 2701 TCU or 3704/3705 communications controller must contain the IBM line adapter and switched line features.

Line Adapter with Auto Answer

If desired, automatic answering capability may be obtained with 3275 units, models 1 and 2, equipped with the dial feature by requesting the IBM 600/1200-bps line adapter with auto answer feature. Auto answer allows the line adapter to respond automatically to a ring signal. This feature is not available to World Trade customers.

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*2000 and 2400-bps are base machine transmission rates for the 3271 and 3275 models 1 and 2. 2000, 2400, 4800, and 7200 bps are base machine transmission rates for the 3271 and 3275 models 11 and 12. 2000 bps is not available to World Trade customers.

Copy

This feature provides the ability to control the interchange of buffer information between devices, either display or printer, that are attached to the same 3271 control unit. The Copy feature is part of the base 3271 models 11 and 12, but is a special feature (at no charge) on models 1 and 2.

Data Analysis - APL Feature

The IBM 3270 Information Display System Data Analysis - APL Feature makes it possible to interact with host-system APL programs and puts an advanced computing system within the reach of a wide range of 3270 users. When installed on the following devices, the feature allows the user to enter, display, and print the full 133-character APL character set:

- 3271 Models 2 and 12 Control Units (remote applications)
- 3272 Model 2 Control Unit (local applications)
- 3277 Model 2 Display Station
- 3284 Model 2 or 3286 Model 2 Printer

Application areas for which APL is being used include production planning, information management systems, mathematical programming, and many types of terminal entry, inquiry, display, or analysis against a data base.

In addition, availability of the TN character set greatly increases the versatility of the system. Previously, users have been restricted by limited character-set availability on cathode-ray tube (CRT) displays and display support printers. With EBCDIC dual-case, TN train graphics, and special characters, it is now possible, for example, to clarify scientific and technical expressions.

All standard 3277 functions remain operational, with the exception of the backspace key. Design modifications are configured to allow field installation of the Data Analysis - APL Feature on standard (monocase) devices.

Keyboards (Figures 2-4 through 2-8)

Numerous keyboard features are available. Variations between keyboards include 78- and 66-key versions: operator console, data entry, typewriter EBCDIC, typewriter with the Data Analysis - APL Feature, and typewriter ASCII layouts. Also, keyboards are available in several different languages, including American English and languages that are applicable to the following countries, which are served by the IBM World Trade Corporation: Austria, Belgium, Denmark, France, Finland, Germany, Italy, Norway, Portugal (and Portuguese speaking countries), Spain (and Spanish speaking countries), Sweden, and the United Kingdom. Refer to Appendix B for a list of keyboard features and World Trade keyboard layout drawings. Typamatic keys, that is, keys that repeat their function when held down, are identified on the keyboard layouts.

Basic display operator needs are fulfilled by the 66-key keyboard. The 78-key keyboard provides expanded operator-to-program message flexibility with 12 additional application program defined keys.

The operator console key layout, which is similar to the IBM 1052 Model 7 keyboard, is available only as a 78-key keyboard. Two types of data entry key layouts are available, each as 66-key keyboards: the data entry keyboard and the data entry keyboard-keypunch layout. Compared to the IBM 24, 26, 29, 59, and 129 keypunch units, the data entry keyboard differs in location of special symbols and the designation of some function keys. The

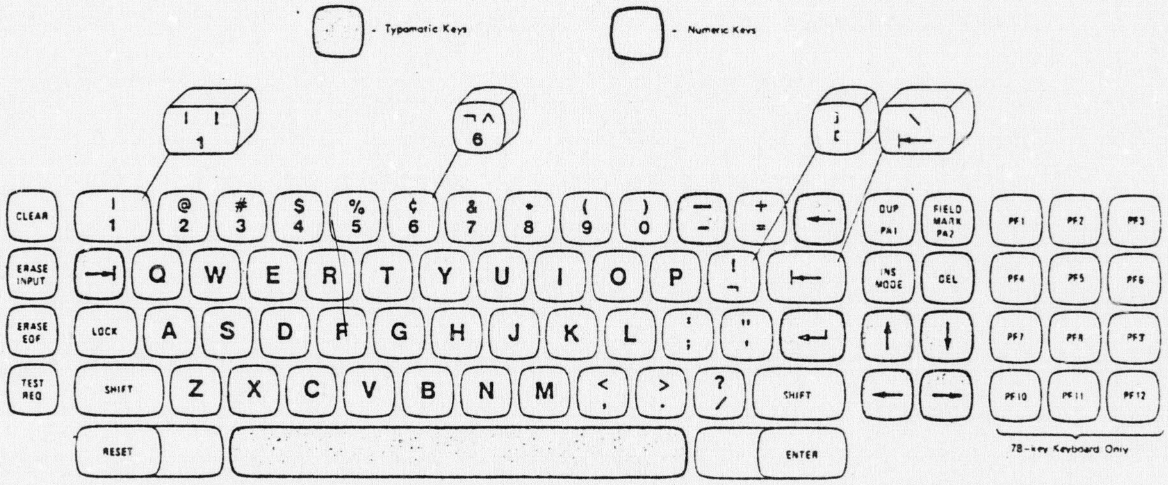


Figure 2-4. Typewriter Keyboard (EBCDIC) - The ASCII typewriter keyboard has four different keys, shown in above keyboard

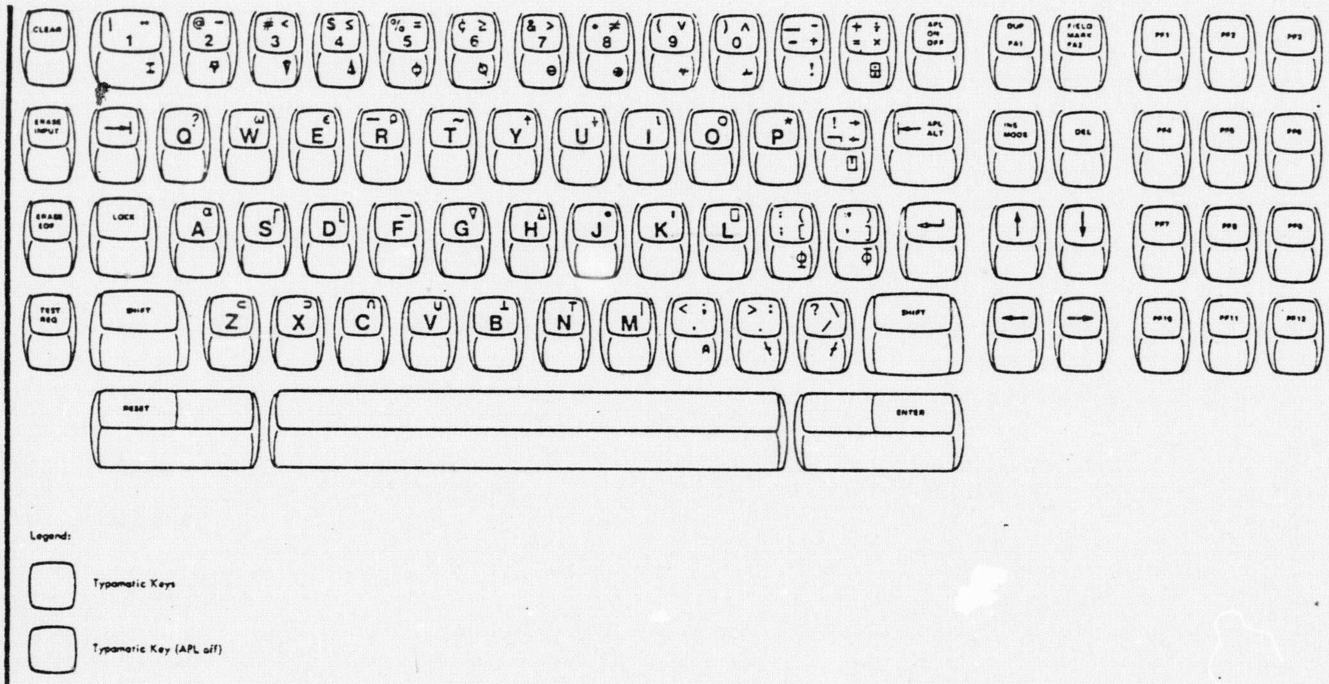

CLEAR
ERASE INPUT
ERASE EOF
TEST REQ
LOCK
SHIFT
APL ON OFF
APL ALT
DUP PA1
FIELD MARK PA2
INS MODE
DEL
PF1
PF2
PF3
PF4
PF5
PF6
PF7
PF8
PF9
PF10
PF11
PF12
RESET
ENTER
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
1 2 3 4 5 6 7 8 9 0
Legend:
Typamatic Keys
Typamatic Key (APL off)

Figure 2-5. Data Analysis - APL Keyboard

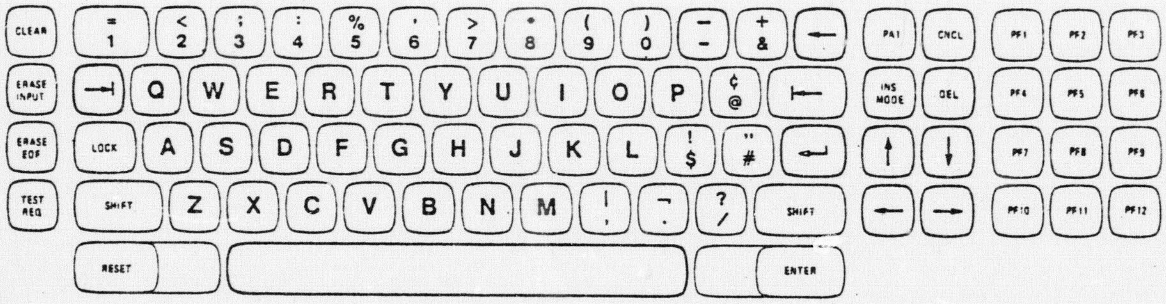

CLEAR
ERASE INPUT
ERASE EOF
TEST REQ
= 1
< 2
; 3
: 4
% 5
' 6
> 7
* 8
(9
) 0
— -
+ &
Q W E R T Y U I O P
¢ @
LOCK
A S D F G H J K L
! $
" #
SHIFT
Z X C V B N M
! ,
¬ .
? /
PA1
CNCL
INS MODE
DEL
PF1
PF2
PF3
PF4
PF5
PF6
PF7
PF8
PF9
PF10
PF11
PF12
RESET
ENTER

Figure 2-6. Operator Console Keyboard

data entry keyboard-keypunch layout more closely resembles the keypunch unit layouts, and, in many cases, is the same (except for function key designations).

Keyboard Numeric Lock

This feature is used in conjunction with a keyboard to provide a means of alerting the operator to a keying mistake. During a numeric operation, this feature inhibits keyboard input operations whenever the operator attempts to enter alphabetic data without purposely overriding the feature. With this feature installed, if any key other than numerals 0 through 9, minus (–), period (.), or duplicate (DUP) is pressed, the keyboard is electrically locked. Once inhibited, keyboard input operations can be resumed only after the operator presses the RESET key at the keyboard. Although this feature is available for all keyboards, its primary application is in a data entry environment where large quantities of numeric data are being entered into the system.

Note: On Austrian/German, Belgian, Danish, French, Italian, Norwegian, Portuguese, and Spanish keyboards with the Numeric Lock feature installed, the comma (,) replaces the period (.) as a valid numeric character.

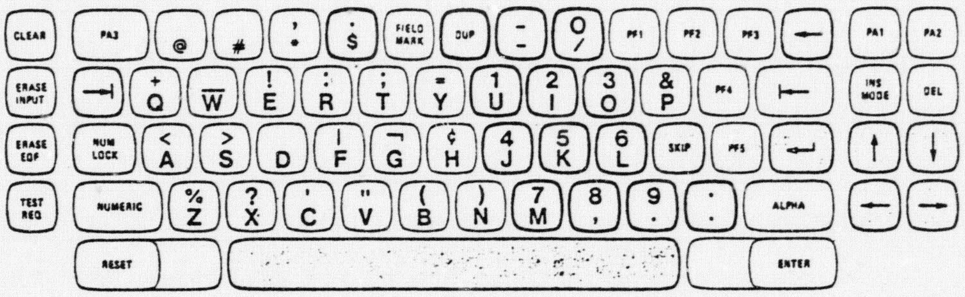
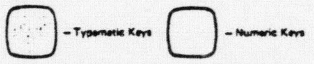

CLEAR
PA3
@
#
,
$
FIELD MARK
DUP
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
Q W E R T Y U I O P
PF4
INS MODE
DEL
ERASE EOF
NUM LOCK
A S D F G H J K L
SKIP
PF5
TEST REQ
NUMERIC
Z X C V B N M
ALPHA
RESET
ENTER

Figure 2-7. Data Entry Keyboard


– Typematic Keys
– Numeric Keys

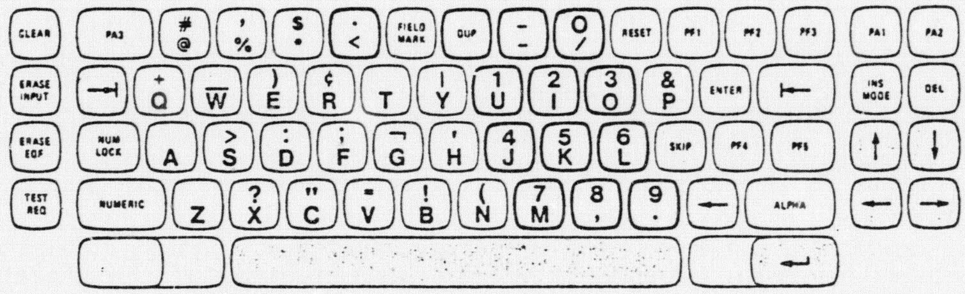

CLEAR
PA3
FIELD MARK
DUP
RESET
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
Q W E R T Y U I O P
ENTER
INS MODE
DEL
ERASE EOF
NUM LOCK
A S D F G H J K L
SKIP
PF4
PF5
TEST REQ
NUMERIC
Z X C V B N M
ALPHA

Figure 2-8. Data Entry Keyboard - Keypunch Layout

Selector Pen (Figure 2-9)

This feature provides a light-sensitive pen with which an operator can identify a portion of a displayed message for entry into the data processing system.

Audible Alarm

The audible alarm feature can be installed on any display station. This feature causes a short audible tone to be sounded whenever an operator enters a character in the next-to-last position of the display image or whenever the tone is called for under program control.

Key Lock (Figure 2-10)

This feature provides key-operated control over communication with the program. With the key off, only a cursor will appear on the display image, the unit will be unavailable to the program, and the display operator will be unable to input messages to the program.

Printer Adapter

This feature provides a 3275 display station (all models) with control circuitry and cable connection outlets to permit attachment of a 3284 printer, model 3.

Operator Identification Card Reader

This feature provides a card reader unit to permit an operator to identify himself to a program. Specially designed magnetic stripe credit cards can be read by the card reader.

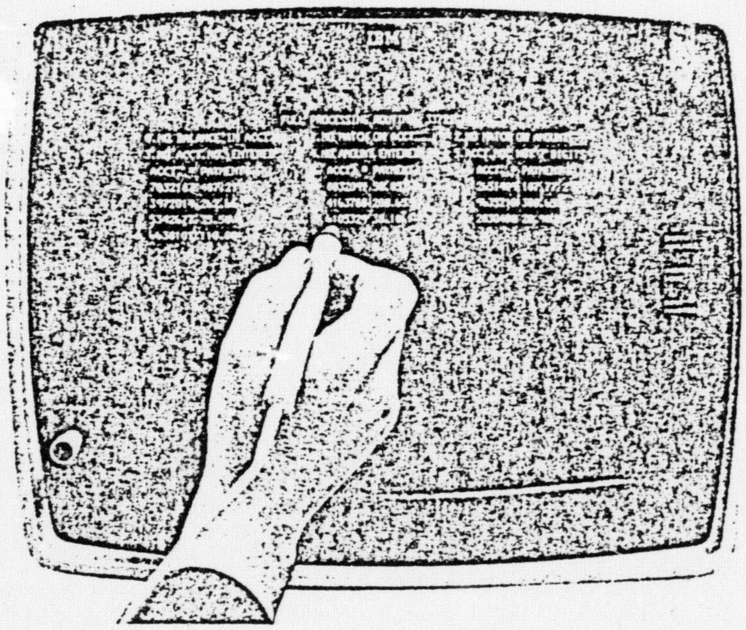


Figure 2-9. Selector Pen in Use

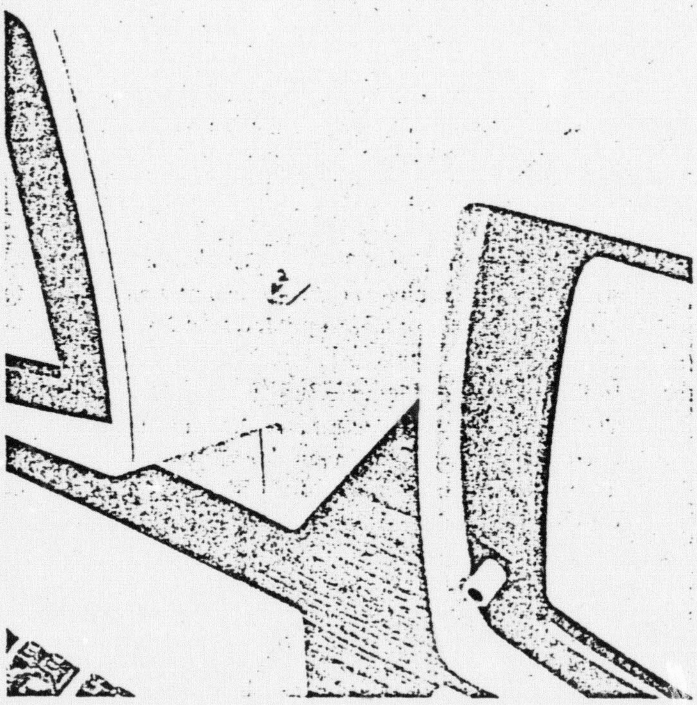


Figure 2-10. Key Lock Feature Installed on a 3277 Display Station

Chapter 3. Functional Capabilities

INTRODUCTION

The IBM 3270 Information Display System introduces a new dimension to display systems design: functional control capability. Design and evaluation of the IBM 2260 Display System led to the conclusion that the total cost of a system can be significantly reduced by minimizing:

- Communication line facilities.
- Transmission control facilities.
- CPU overhead.
- Channel utilization.

To reduce system costs associated with these items, numerous hardware and programming features that together provide functional control capability have been incorporated in the 3270 display system.

Functional Control Capability

The functional control capability of the 3270 display system consists of the following features:

- Format control by data field.
- Addressing or updating, or both, of any character position of the display image.
- Null suppression.
- BSC or SDLC line control.
- Channel interface data rates up to 650,000 characters per second.
- Communication line transmission speeds up to 7200 bps.
- Protected data image format.
- Select.
- Read modified data.
- Copy.
- Erase unprotected.
- Short read.
- Repeat characters.
- Program tab.
- Remote general poll.
- Dial, for remote systems that use the 3275 model 1 or 2 (BSC line control).
- Line Adapter.
- Line Adapter with Auto Answer, for remote systems that use the 3275 model 1 or 2 (BSC line control).

To use this new functional control capability effectively, the system designer must consider: the display image formats, transaction design, communication facilities, operator wait times, operator costs, channel loading, number of CPU interrupts, number of TP messages, and application program design. He can do this best by selecting a typical transaction and evaluating the effects of functional control capability on system costs and performance. This evaluation, coupled with an evaluation of operator control capabilities, system configuration considerations, physical considerations, and installation planning considerations, will determine the best ratio between cost and performance for a display system.

Operator Control Capabilities

The 3270 display system also provides operator control capabilities that allow maximum operator efficiency with a minimum of retraining. The advantages of card punch and typewriter keyboard designs have been incorporated into the 3270 data entry and typewriter keyboard options. The highlights of the functional capabilities of the 3270 display system are described below.

FUNCTIONAL CONTROL CAPABILITY

Format Control by Data Field

The 3270 display system provides program control by data field. Each data field is established when a field attribute control code is written in the first position of the field. The field attribute control code, which is written by the program, utilizes a single nondisplayed character position and serves as a visual separation between successive fields. A field may be started at any character position of the image. The characteristics controlled by the attribute control code include:

- Protected (fixed format).
- Unprotected (variable input data).
- Brightness (off/normal/bright).
- Alphameric input.
- Numeric input (auto shift).
- Auto lock.
- Auto skip.
- Selector pen detectable.
- Tab stop.

Character Addressing

Addressing facilities are provided by the 3270 display system to allow starting a program write at any character position of the image. The write address can be set any number of times during an image write or update, or both. This allows selective writes to various noncontiguous areas of the image. This facility also allows the modification of single or multiple field attribute control characters as well as data characters.

Null Suppression

To minimize message lengths while providing maximum length input fields, 3270 display system data fields can be erased to null codes under operator or program control. As an operator keys input data into a field, data codes replace null codes, leaving null codes in any unkeyed positions of the field. When a read modified message is sent to the CPU, null codes are not transmitted as part of the message. This facility eliminates the transmission of nonmeaningful codes from unused positions of a field.

BSC and SDLC Line Control

The IBM BSC line control design provides efficient transmission reliability and comprehensive data checking. The IBM SDLC line control, compared with BSC operation, provides more extensive data-checking capability and results in greater transmission efficiency and utilization of common carrier facilities. Using SDLC, a communications controller may simultaneously transmit to one 3271 or 3275 (model 11 or 12) while receiving from another 3271 or 3275 unit.

Channel Interface Speeds

Data transfer rates of 10,000 to 650,000 characters per second are provided to allow operation at the speed of the channel to reduce response time and CPU loading by allowing faster completion of a transaction. This capability allows highly efficient local display systems to be developed and removes the restrictions imposed by the data rate (2560 characters per second) of the IBM 2260.

Communication Line Speeds

The capability to transmit data at speeds of up to 7200 bps provides a significant performance advantage over slower transmission data rates. In many instances, higher line speeds will significantly reduce the number of communications lines required to support remote display systems and greatly reduce response times.

Protected Data Image Format

The protected data image format capability allows a format that contains field labels, instructions, and field control information to be written to a display station once and reused any number of times with variable input or output data. For file inquiry, a protected data image format can be written to the display station once, allowing subsequent transmission of only the variable data records. Similarly, a protected data image format can be written to a display station once and can be used many times for repetitive key entry input transactions.

Select

Display systems directly attached to a channel require a buffer load delay to prepare to execute a write operation. A select operation is provided to allow a selector or block multiplexer channel to be released for other use during this delay time.

Read Modified

A read modified operation capability is provided that transfers only operator-modified data fields with null codes suppressed. This operation reduces the message size by including essential data only, thus minimizing communication line and channel loading.

Copy

A copy operation capability is used on remote 3270 systems employing the 3271 to control the interchange of buffer information between devices attached to the same control unit. For example, any display station image can be printed out at any printer by means of a copy operation. On a copy operation the device buffer transfer is concluded within the 3270 display system, thus total message transmission to the 3270 is significantly reduced. Because the internal 3270 operating rate is far greater than the remote transmission rates, substantially shorter response time can be maintained. An additional example, showing the value of the copy operation, is the case where one basic display image format is frequently used at several display stations in the 3270 display system. The image format need be transmitted to a device on the 3270 display system only once; thereafter, a copy operation can be used to copy the image format from one device buffer to another.

Erase Unprotected

An erase unprotected operation capability is provided that erases all unprotected data fields to null codes and positions the cursor in the first unprotected field of the image. This operation eliminates the buffer load delay that is associated with a normal write operation.

Short Read

To allow an operator to communicate with the program without transmitting unprotected data fields to the CPU, program access (PA) keys have been provided. Pressing one of these keys causes a short read operation that restricts the information transmitted to that required to identify which of the keys caused the attention. This eliminates the transmission of nonmeaningful data to the CPU, thereby minimizing communication line and channel loading.

Repeat Characters

To minimize the number of data characters that must be transmitted to a display station, capability is provided to cause the display hardware to repeatedly write a specified character code from the current write address position into all positions up to a specified address. By the use of this facility, four control bytes transmitted to the display system can cause up to 480 identical character codes to be written to a model 1 display station or 1920 identical character codes to be written to a model 2 display station.

Program Tab

To minimize the length of a message transmitted to a display station, capability is provided that will automatically write successive data fields into successive unprotected data fields that were previously defined by an image format. This eliminates the requirement to transmit control characters to specify the starting address of noncontiguous data, reducing the number of control characters required.

Selector Pen

The 3270 display system offers a new concept in light pen design. Previously, light pens required a heavy CPU interrupt loading, and the response characteristics of remote display systems prevented their practical use on a remotely attached display system. The 3270 selector pen provides new capability for handling transactions in the display system hardware, thereby providing a minimum of CPU interrupts and response times of less than 0.4 second for selector pens attached to both local and remote display systems.

Remote General Poll

Provisions are made in the control unit hardware to allow the program, with a general poll instruction, to interrogate all devices attached to the control unit with just one request. This results in greatly reduced polling overhead and minimizes communication line loading.

Dial Feature

This special feature attaches a 3275 display station, model 1 or 2, to a computer system via a common-carrier switched telephone network and the IBM line adapter (or equivalent modem). Permanently attached leased-network lines are not required for dial feature attachment; thus, network operating costs are reduced, and system flexibility is added in some communication environments. Clocking is obtained from the 3275, which must be equipped with the 1200-bps transmission speed capability (provided as part of the dial feature). EBCDIC or ASCII transmission codes may be used. The BSC point-to-point contention line discipline is employed.

The dial feature provides a DISCONNECT toggle switch (shown in Figure 3-1) to terminate a call. A 3275 equipped with the dial feature may be attached to the telephone

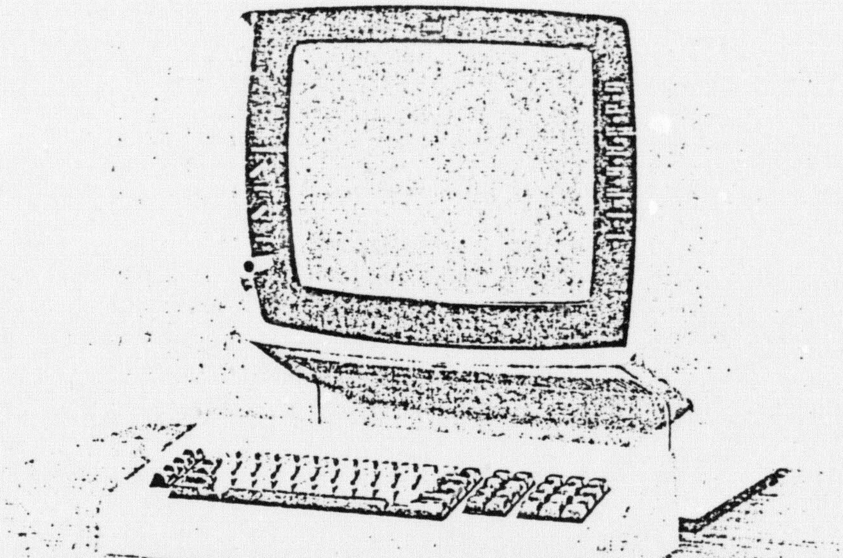


Figure 3-1. 3275 Display Station with Dial Feature Installed (Design Model)

network through an external modem or via a modem mounted within the 3275 and called the IBM line adapter.

Line Adapter (1200-bps Integrated Modem)

The line adapter is a low-cost modem that is placed within the 3275 models 1 and 2 for leased line or switched network operation, or is placed within the 3275 models 11 and 12 for leased line operation. When installed in a 3275, model 1 or 2, it operates at 600 or 1200 bps (determined concurrently by the 3275 BIT RATE switch and the selected TCU). The line adapter provides an electrical interface between a 3275 display station and common-carrier leased telephone lines or, when the dial feature is selected, between a 3275 and a switched telephone network. With dial capability present, the line adapters are attached to the telephone lines by data access arrangements, which are required coupling devices that are available from the telephone company. The line adapter operates at 1200 bps on leased lines.

The line adapter may be obtained with automatic answering capability.

Line Adapter with Auto Answer

The line adapter with Auto Answer feature is applicable to the 3275, model 1 or 2, using the dial feature. The auto answer portion of the line adapter provides the 3275 with the capability of automatically answering incoming calls from the central processor, without operator assistance. If a call has been answered, and if at any time data or control information is not received or transmitted by the 3275 within 20 seconds, the 3275 automatically disconnects (hangs up). This timeout prevents the 3275 from tieing up the line upon receiving an erroneous phone call.

OPERATOR CONTROL CAPABILITIES

The 3270 display system provides numerous operator control capabilities to maximize operator efficiency and minimize operator training costs.

Keyboard Options

Six keyboard options are provided to allow a display system to be tailored to the requirements of each application. Similar keyboards are interchangeable and may be used with any of the 3270 display stations. The following keyboard options are offered:

1. Typewriter keyboard.
2. Typewriter keyboard with 12 program function keys.
3. Typewriter keyboard with the Data Analysis - APL Feature.
4. Data entry keyboard.
5. Data entry keyboard – keypunch layout.
6. Operator console keyboard with 12 program function keys.

Keyboard Functions

Cursor Positioning Controls

Several cursor controls are provided to permit rapid positioning of the cursor to any character position on the display image. Included in these cursor controls are:

- Up (↑), Down (↓), Left (←), and Right (→) keys
- Backspace (←) key*
- Tab (→) or SKIP and Backtab (←) keys
- New Line (←) key

Editing Controls

Two keys, INS MODE and DEL, enable a display operator to perform unique editing functions. The INS MODE key allows characters to be inserted into a field, while all characters following the point of insertion are shifted to the right. The DEL key has an opposite function: characters can be deleted from a field, while all characters on the same line and following the point of deletion are shifted left.

Program Function and Program Access Keys

Program function (PF) keys allow any input data on the screen to be transmitted to the program together with a code that identifies which program function key was pressed. Program access (PA) keys allow a code to be transmitted to the program to identify which key was pressed, but no input data from the screen is transmitted to the program.

Numeric Lock Feature

This feature provides a means of alerting the display operator to certain keying errors. With a data entry keyboard, when the cursor is positioned within a numeric input field the display station automatically upshifts the keyboard. With the numeric lock feature, the keyboard is electrically locked if any key other than the numerals 0 through 9, minus (-), period (.), or duplicate (DUP) is pressed.

Note: On Austrian/German, Belgian, Danish, French, Italian, Norwegian, Portuguese, and Spanish keyboards with the Numeric Lock feature installed, the comma (,) replaces the period (.) as a valid numeric character.

Shift Keys

All typewriter and operator console keyboards are provided with the standard typewriter shift keys: SHIFT and LOCK. These keys function exactly like typewriter shift keys to allow access to upshift characters. Data entry keyboards are provided with the ALPHA (alphameric) and NUMERIC shift keys. The ALPHA shift key is used to override a numeric (input) field definition and the numeric lock special feature to purposely input alphameric data into a numeric field. The NUMERIC shift key also overrides the numeric field definition and numeric lock condition to permit upshift character entry for other characters.

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*Not on Data Analysis - APL keyboard (use cursor-left key).

Duplicate (DUP) Key

This key allows a unique code, which is displayed as an asterisk (*), to be inputted to the program, while the cursor is advanced automatically to the next input field. The DUP code is typically interpreted by the program to mean duplicate this field from the previous record.

Erasing Controls

The CLEAR, ERASE EOF, and ERASE INPUT keys provide erasing functions by setting to null codes any character positions on the display image that are affected by the key operation. If the operator must erase the entire display image and the image format, the CLEAR key is used. The ERASE EOF key is used when the display operator inputs data into part of a field and wants the rest of the field erased. The ERASE INPUT key is used to erase all input fields on the display image.

Data Analysis - APL Feature Controls

With the Data Analysis - APL Feature installed, the Backspace and Backtab keys take on new or added functions. APL is enabled by pressing the APL ON/OFF (Backspace) key once. The keyboard is restored to standard 3277 typewriter operation by pressing the APL ON/OFF key once more. With APL "on," the entire 133-character APL set is available for use. The 18 compound symbols and the underscored uppercase alphabet can be entered by simultaneous use of the APL ALT (Backtab) key which, with APL "on", functions as an additional shift key. These characters may now be entered directly, rather than through character-backspace-character sequences.

The APL characters generated are displayed in Appendix C.

Audible Alarm

This special feature can be used by the application program to alert the display operator for any application. Additionally, the alarm sounds whenever the operator inputs a data character into the next to last character of the display image.

Security Enhancements

Key Lock

This special feature provides a display operator with a key that can be used to disable the display station whenever it is to be left unattended. The unit is enabled when the proper key is inserted in the lock and turned to the "on" position.

Operator Identification Card Reader

This feature is provided to enter system user identification. This capability enhances the (programmed) control of operator access to data and an audit of operator actions. Additionally, this feature may be used to enter any sequence of characters (prerecorded on a card) for other purposes, such as transaction control, account control, and billing.

Credit cards having an encoded magnetic stripe can be read by the card reader. The magnetic stripe containing numeric and control information is on the back of the card. Magnetic stripe credit cards may be ordered with up to 40 numeric characters, including control characters, or they may be obtained pre-recorded and pre-embossed with a maximum of 16 numeric characters.

Non-Display Keying Mode

This unique mode of operation permits program definition of fields so they will accept data entered from the keyboard without displaying the data on the screen.

Chapter 4. Applications

Display stations can be used advantageously in many data-processing applications. The three general categories of applications for display stations are:

- Inquiry
- Data entry
- System operator's console

The material under "Application Types" discusses these categories in terms of application types that are found throughout the data-processing industry. The distinctive characteristics and the business uses of each type of application are discussed, and the features that make the 3270 display system well suited for each application type are listed.

APPLICATION TYPES

Inquiry

A display station that is used with an inquiry application allows the operator to have rapid access to the central computer file. Five types of inquiry applications are described below.

Simple Inquiry

In a simple inquiry application, there is a small input message, for example, a name or an account number. The output message is short (for example, "yes" or "no"), predictable within a narrow range of possibilities, and required quickly. This is a repetitive operation.

A credit house uses a simple inquiry application to determine whether a charge customer should be allowed to make additional charge purchases. Usually, the person who needs the information has telephoned the request to the credit house and waits for the reply.

The 3277 display station, attached locally or remotely, can be used in a simple inquiry application. The efficiency of data transmission between the system and the operator makes the 3270 display system desirable in this type of application because of the high volume of requests and the necessity for rapid retrieval of information.

Complex Inquiry

In a complex inquiry application, the input message is small (up to 100 characters). The output message is large (an entire screen or several screens of data) and often contains historical or status information.

This type of application is used by insurance companies to get policy information about policyholders. A credit house uses a complex inquiry application when getting a complete credit history of a person who is trying to establish credit.

The editing tools of the 3270 display system and its ability to transmit data efficiently are advantageous in a complex inquiry application. The 3277 display station, model 2, is useful because large amounts of output data can be displayed.

Inquiry with File Update

In an inquiry with file update application, the input message is again about 100 characters, and the output message can be several screens of data. Part of the displayed record is modified by the display operator after the output message has been viewed. A customer service application is a specialized form of the inquiry with file update application.

State and local governments (for example, departments of tax and welfare) use inquiry with file update applications to review and change official records. This application is also used by a credit house to record credit payments and by an insurance company to make policy changes.

The 3277 display station, model 1 or model 2, can be used, depending on the amount of data output from the processing program. The terminals can be attached locally or remotely. Formatting and editing tools are useful for applications that move data into specific areas or that modify input data. The 3284, 3286, or 3288 printer can be used to get a printed copy of the latest records.

Conversational Inquiry

In a conversational application, a progression of input and output messages leads up to a completed transaction. The output message often determines the next input message; for example, an output message that contains a series of items from which the operator must make a selection is the basis of the next input message.

A catalog order house uses conversational applications. In this use, an order might be entered in the following sequence:

INPUT MESSAGE, AN ORDER NUMBER	54763D
OUTPUT MESSAGE	Size (S, M, L)
INPUT MESSAGE	S
OUTPUT MESSAGE	Color (BLK, GRN, OR)
INPUT MESSAGE	GRN
OUTPUT MESSAGE	quantity
INPUT MESSAGE	15

Simulation programming, problem solving, and modeling are specialized versions of a conversational application.

The 3277 display station and 3284, 3286, or 3288 printer can be used in a conversational application. Editing and formatting tools aid the operator when messages consist of fill-in-the blanks and other formatted forms. Modified-data-only and null suppression for transmission efficiency aid message flow.

Conversational Inquiry with File Update

In an inquiry application that combines conversational and file update, many input and output message steps complete one transaction that initiates other processing transactions (for example, production and warehouse control, shipping, and receiving), which are not necessarily done on the display. These other processing transactions are applications that are used by distributors, manufacturers, and service order businesses.

The 3270 display system is a compatible family of general-purpose products that have been designed to solve a wide range of customer application problems. This application can use the 3277 display station, attached locally or remotely, in combination with the 3284, 3286, or 3288 printer for printed output.

Interactive Computing with APL

With the Data Analysis - APL Feature installed, an interactive environment for APL users is provided by Virtual Storage Personal Computing (VSPC), and VSAPL. Direct interaction between the terminal user and host APL programs is made available, and entry, revision, and printing of data files are made possible at the remote terminal site.

Data Entry

A display used for a data entry application can replace conventional keypunch equipment. Two types of data entry applications are described below.

Source File Update

In a source file update application, the first step is some type of inquiry to get access to the data that must be modified. Next, the transaction is processed, and the data in the working file is updated immediately.

A state department of motor vehicles uses this type of application to update the large central files on drivers and vehicles as information is sent in from local offices. Remotely configured display stations of the 3270 display system can be used at local offices to provide input to the central office. The 3277 display station, attached locally at the computing installation, can be used for direct input to the computing file. Formatting and editing features aid the operator in making corrections and entering data in predefined formats.

Online Key Entry

In an online key entry application, records are batched and are entered into an intermediate file that is online, usually on disk. This file is rapidly available to the processing program. The online key entry procedure is used to copy large amounts of data and is designed for high productivity and efficiency. The aim is to eliminate from the computing installation clerical functions that are not essential to data-processing activity (for example, receiving a job and scheduling it for keypunching and handling cards and tapes).

Payroll and inventory control are applications in which large amounts of data are entered into a computing system for separate processing by the application program.

The 3270 display system can be used for online key entry. The editing tools help the operator verify that input data is correct. Formatted fields and protected data make the operation more productive because input need not be in a character-oriented stream. Remotely attached displays can be used (even though an online key entry application is directed toward high volume) because the devices have high data-transmission efficiency.

System Operator's Console

A display station that is used as a system operator's console is used in place of conventional typewriter consoles. The display console can hold many system messages and can display them faster than a typewriter console. Two types of system operator's console applications are discussed below; either application might be useful to any computing installation. Programming support available for these applications is described under "Display Console Support" in Chapter 5.

Display Operator Console

In a display operator console application, the system operator uses the display station to control the operation of the system by entering data into the system and receiving it from the system.

The 3277 display station, model 2, displays large amounts of data. Messages can be separated into different areas on the screen, depending on the type of message that is being displayed. For example, status displays and warnings can be displayed in their own predefined areas. A keyboard is used with the display so that the operator can enter commands and other data. The program function keys and the selector pen can be used to enter predefined commands.

Output-Only Display Console

In an output-only application, the display console can be used for status displays or operator messages, but it cannot be used to enter data into the system. Display consoles used in this type of application monitor system activity. They can be used in areas away from the central processing unit, for example, in the tape and disk libraries. Also, they can be available at several locations in the computing installation as backup for the display operator console. As no data is entered from the device, a keyboard is not necessary. Since the messages are small, the 3277 display station, model 1, can be used in an output-only display console application.

ADVANTAGES OF DISPLAY SYSTEMS

Many installations must answer questions concerning the status of an account or check the disposition of an order while someone waits on the telephone or in the office; also, there may be a high volume of requests for information. When a display station is used, the person waiting can be given fast service. Furthermore, the information is obtained directly from the computer file, thereby avoiding unnecessary clerical operations.

Because display stations can be connected remotely to the computer by means of telephone lines, they can be far from the central file. There can be many people at many locations using the system at the same time. The users at one location can have rapid response to input, even though the files are maintained at a central location that is distant.

An operator of a display station is probably familiar with several parts of the device because the parts are similar to common objects. For example, the keyboard that is used to enter data is similar to a typewriter keyboard, and the output is displayed on a TV-like screen. The display operator can treat the displayed information as if it were in a book; he can turn the pages of the file, looking at one page at a time, making additions and corrections to the data in the format displayed on the screen, checking each page for accuracy, and extracting information he needs.

ADVANTAGES OF THE 3270 DISPLAY SYSTEM

The 3270 display system is well suited to the types of applications that are listed above. Some of the specific benefits offered by the system follow.

The display operator can enter data in free form. For example, he types in the name and account number of a customer's file; then he types in an order that consists of part number, quantity, price, and special instructions. The sequence of items in the entry is important, but the location of the items on the screen is not. The data could be entered on one or two lines, or each item could be entered on one line.

The display operator can also enter data in formatted form. For example, in typing in a sell-stock order, he would type data opposite the following labels:

ACCOUNT NUMBER:
STOCK IDENTIFIER:
QUANTITY:
SELLING PRICE:

After the operation, the screen would show:

ACCOUNT NUMBER: 7246
STOCK IDENTIFIER: ABC
QUANTITY: 50 SHARES
SELLING PRICE: 5-1/2

There are aids to help the display operator manipulate data that is to be entered in formatted form.

- He is prevented from entering data into a protected field. In an application where he must enter certain items (renewal date of driver's license, amount to be paid, and change of address), but where he cannot modify other items (driver's license number), he is prevented from doing so. He can skip over a protected field by pressing the SKIP key or the Tab key.

  He can change unprotected alphameric data; he must use special keys to change numeric-only data. He can erase the screen, a field, or characters in a field, and can use the two edit keys (INS MODE and DEL) to correct data. Characters to be corrected are located easily, because the cursor can be moved rapidly in any one of four directions.
- The display station can present selected data items at a brighter intensity than other data on the screen. Intensified data can be distinguished easily. This ability would be useful in an application in which exceptions must be apparent. For example, in a credit authorization application in which the customer's balance cannot be greater than a specified amount, the balance and the limit would be intensified, and the operator could easily compare them.
- The display operator can enter data in fields that are programmed to prevent data from being displayed or printed out. This benefits applications where there are security restrictions on some part of files. In such a use, the operator must enter a special password or identification for access to the data. This identification can be entered in nondisplay fields to prevent unauthorized acquisition of the identification.

APPLICATION HIGHLIGHTS OF A 3270 DISPLAY SYSTEM

This section describes how a 3270 display system can be used in an application. The description is simplified to emphasize the role of the display station.

A vending company sells goods and services to companies and sends its customers monthly bills. The company's accounting department is automated and uses the IBM 3277 Display Station, Model 2, that has the optional data entry keyboard layout, numeric lock, selector pen, and audible alarm. The account-processing procedure is as follows.

A tally of goods and services is computed, and the bill that is sent is in the format:

DATE/OLD AMOUNT/LAST PAYMENT/CHARGES/
NEW TOTAL

All bills are sent out on the fifteenth of the month. Customers may make full or partial payment; payment is requested within 30 days. When payment is made, the customer returns part of the bill, which shows:

CUSTOMER'S NAME
ACCOUNT NUMBER (SEVEN DIGITS)
VENDOR'S BILLING AMOUNT
PAYMENT AMOUNT

Every day, the vending company's accounting department receives payments and the returned part of the bill and sorts them alphabetically in the batches: A–E, F–J, K–O, P–T, and U–Z. One accounting department employee handles the entire accounting procedure for one batch. Each batch is divided for full-payment processing (vendor's billing amount and payment amount are equal) and other-amount processing.

Two service representatives are in direct contact with customers and must have immediate access to the latest records to take care of customers' problems. These two employees use 3277 display stations, model 2, that have the 66-key data entry EBCDIC keyboard. The display stations make the latest version of the accounts quickly available to the representatives for customers who usually discuss problems over the telephone. The 5 user-interpretable keys on the keyboard have been given special meanings to help the representatives get customer data. For example, one key is used to have the application program move the display forward to the next part of the data file, and one key is used to move the display backward to the previous part of the data file.

The accounting department employee takes one of the two sets of payments in his alphabetical batch and, using the selector pen, selects from the instructions that are first presented on the display station the name of the processing routine he will use, either FULL or OTHER. Then, instructions for the operator to follow when entering payment data are displayed on the first four lines of the screen.

When processing under the FULL payment routine, the accounting department employee types, in two predefined fields, the account number and payment amount for a customer. He can type in data for three customers on one line and up to 20 lines on each display. A maximum of 60 accounts can be entered at once.

The following aids help the employee enter data quickly:

1. The data entry keyboard layout allows all typing to be done with the right hand, leaving the left hand free to turn payment vouchers.
2. The numeric lock and program-controlled, numeric-only field definition prevent the employee from entering alphabetic data accidentally.
3. One space is skipped automatically, under program control, after the account number has been typed in. This saves a typing stroke between account number and amount.
4. The SKIP key allows the operator to skip over unused spaces in the amount field to the next account number field. The operator is freed from keeping track of how many numbers were entered for the amount and how many spaces are left in the field.

After all data has been entered, the employee presses the ENTER key, and only the information that was entered is sent to the computer. The FULL payment routine checks each account number and amount to ensure that (1) an account number and amount have been entered (for example, that no field is blank because the operator pressed the SKIP key twice), (2) the account number has seven digits and matches an account number in the balance-due file, and (3) the payment matches the amount in the balance-due file. If any of these checks fails, an error code describing the error is displayed in brighter intensity next to the incorrect entry. With the full screen of data that was entered still in view, the operator can go back through the bills and locate the data for entries that must be corrected.

Corrections are easily made by positioning the cursor at the error and typing the correction over the error or by using the text-editing control keys. Corrections are displayed immediately. The operator again presses the ENTER key, and, if no additional errors have been made, the transactions are applied to the customer's accounts. Data transmission is efficient, because only modified data is transmitted, null characters are not transmitted, and the screen can hold up to 1920 characters. The instruction lines are left on the screen, but the data entered by the display operator is cleared so that new entries can be made.

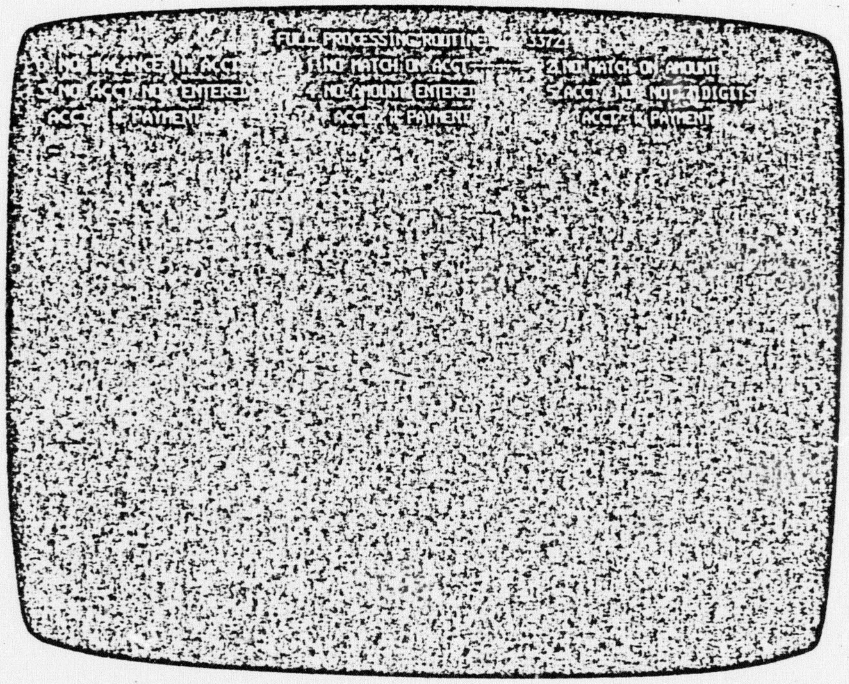
Processing of customers' accounts under the OTHER payment routine is as follows. The employee types in the account number and amount in the preplanned layout. The routine checks all data to ensure that the account number is valid (that is, seven digits and amount have been entered) and that it matches a number in the balance-due file. Errors are noted, and corrections are made in the same way as when processing under FULL. When a match of account numbers is found, the program deducts the payment from the amount due and computes the new balance. If an overpayment is made, the amount of credit is noted for the next bill.

Refer to Figures 4-1 through 4-3 to see what the operator sees as this accounting procedure is being followed.

The application program, which the FULL and OTHER processing routines are part of, performs other accounting work. It totals each day's payments that were applied to the customers' accounts and prepares a bank deposit voucher, which is printed out on a printer; it also checks the payments-due file at the end of the billing cycle for accounts that were not paid.

When a customer calls in for account information, he is referred to the service representative who handles his file.

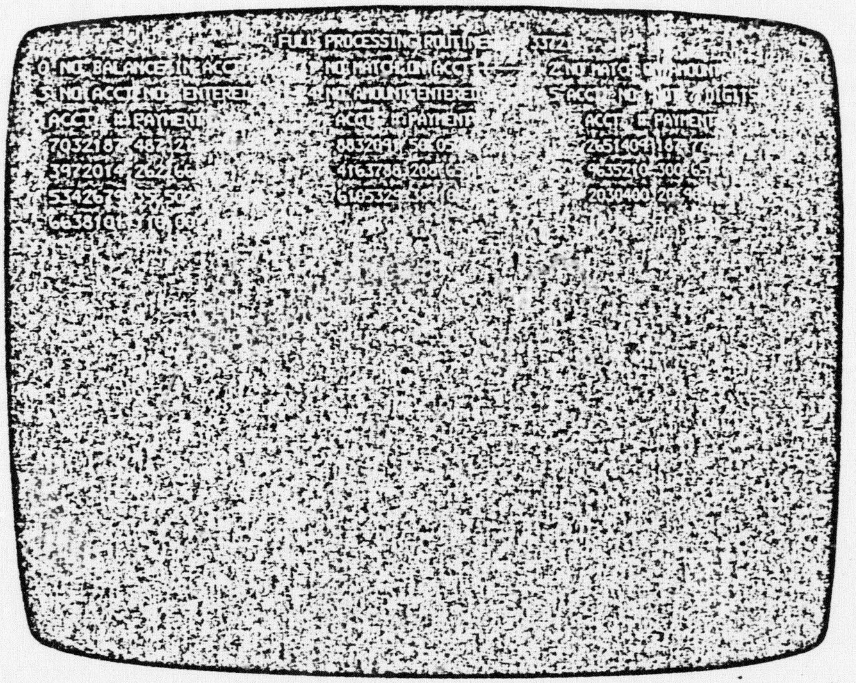
The service representative types in the account number on the keyboard of the display. The system retrieves the account file and presents the most recent transactions on the screen. The representative can cause data from earlier transactions to be displayed. This use of the display system by the vendor helps the company maintain close contact with its customers. Quick handling of problems gives customers confidence in the vendor's ability to provide the offered goods and services.



```
                    FULL PROCESSING ROUTINE      33721
0 NO BALANCE IN ACCT      1 NO MATCH ON ACCT       2 NO MATCH ON AMOUNT
3 NO ACCT NO ENTERED      4 NO AMOUNT ENTERED      5 ACCT NO NOT 7 DIGITS
  ACCT #  PAYMENT            ACCT #  PAYMENT           ACCT #  PAYMENT
```

Figure 4-1. Displays Appearing during Sample Accounting Procedure (Display 1 of 3)

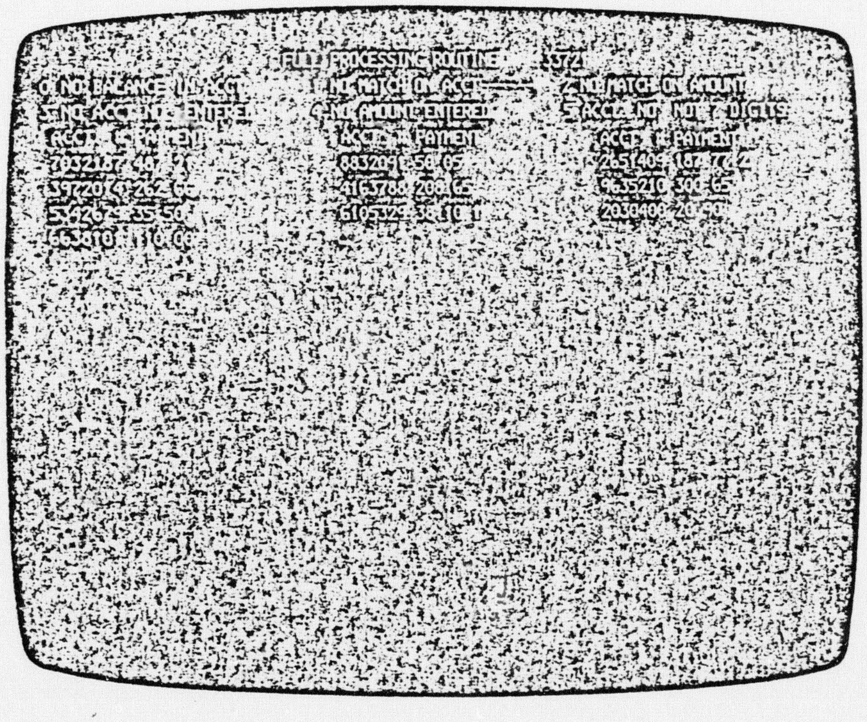
This display appears after the operator has selected the routine that will process a batch of transactions. The first four lines on the screen contain the name of the processing routine (FULL), error codes returned by the system if the information that has been typed in is incorrect, and column headings to help the operator type in data.



```
                    FULL PROCESSING ROUTINE    3372
0 NO BALANCE IN ACCT        1 NO MATCH ON ACCT        2 NO MATCH ON AMOUNT
3 NO ACCT NO ENTERED        4 NO AMOUNT ENTERED       5 ACCT NO NOT 7 DIGITS
ACCT # PAYMENT              ACCT # PAYMENT            ACCT # PAYMENT
7032187 487.21              8832091 58.05             2651409 187.74
3972014 262.66              4163788 208.65            9635210 300.65
5342679 35.50               6105329 38.10             2030400 20.98
6638101 310.00
```

The operator sees this display as data is being typed in. The next entry can be made at the cursor.

Figure 4-2. Displays Appearing during Sample Accounting Procedure (Display 2 of 3)



```
                    FULL PROCESSING ROUTINE    3372
0 NO BALANCE IN ACCT        1 NO MATCH ON ACCT        2 NO MATCH ON AMOUNT
3 NO ACCT NO ENTERED        4 NO AMOUNT ENTERED       5 ACCT NO NOT 7 DIGITS
ACCT # PAYMENT              ACCT # PAYMENT            ACCT # PAYMENT
7032187 487.[illegible]     8832091 58.05             2651409 187.74 2
3972014 262.66              4163788 208.65            9635210 300.65
5342679 35.50               6105329 38.10             2030400 20.98
6638101 310.00
```

If errors are found, a code is displayed next to the data that is incorrect. The error code is in a brighter intensity than the data that has been typed in. Error codes appear on lines 5 and 7.

Figure 4-3. Displays Appearing during Sample Accounting Procedure (Display 3 of 3)

Chapter 5. Programming Support

INTRODUCTION

This chapter describes the programming support that is available for the 3270 display system.

Telecommunications support for the 3270 display system is provided by the Basic Telecommunications Access Method (BTAM) under the Disk Operating System and the Operating System, the Telecommunications Access Method (TCAM) under the Operating System, and the Virtual Telecommunications Access Method (VTAM) under DOS/VS, OS/VS 1, and OS/VS 2.

Display console support for local 3270 displays and printers used as operator's consoles is available through Device Independent Display Operator Console Support (DIDOCS) and Status Display Support (SDS) under the Operating System. DIDOCS provides uniform services for all display operator's consoles on MFT, MVT, and VS systems. Status Display Support extends existing system status display services to improve the way information is presented to the operator. Local 3270 display and printer support is comparable to the DIDOCS and SDS support for other devices.

BTAM, TCAM, VTAM, DIDOCS, and SDS are supplied without additional charge to users of IBM data processing systems.

VIDEO/370 is a program product that allows OS or DOS users to enter and verify data at local or remote 3277/3275 displays.

DATA/360 is a program product that allows OS or DOS users to enter and verify data at 3277 displays.

IMS allows OS users to use the 3270 system for d[illegible] base and data communication applications.

IQF is a terminal-oriented query application program that uses the 3270 system under either DOS or OS.

CICS uses the 3270 system under DOS or OS for data base or data communication application.

The Time-Sharing Option (TSO) of OS/MVT and OS/VS2 uses the 3270 system for terminal-oriented, time-sharing applications.

The Virtual Machine Facility/370 (VM/370) allows the 3270 system to be used for virtual machine operators' consoles and user terminals.

BTAM, TCAM, DIDOCS, SDS, TSO, and VM/370 are supplied without additional charge to users of IBM data processing systems.

Details about programming support that is applicable to remote display systems that use BSC or SDLC line discipline may be obtained from the IBM marketing representative.

TELECOMMUNICATIONS ACCESS METHODS

The Basic Telecommunications Access Method (BTAM) is used to control the transfer of data between main storage and local or remote terminals. BTAM provides the application program with macro instructions for using the capabilities of the devices supported. BTAM supports binary synchronous, as well as start-stop, communication.

For a detailed description of BTAM under the System/360 Disk Operating System, see *IBM System/360 Disk Operating System: Basic Telecommunications Access Method*, GC30-5001; for BTAM under the Disk Operating System with virtual storage, see *DOS/VS BTAM*, GC27-6989; for BTAM under the operating system with MFT or MVT, see *IBM System/360 Operating System: Basic Telecommunications Access Method*, GC30-2004; for BTAM under VS, see *OS/VS BTAM*, GC27-6980.

The Operating System Telecommunications Access Method (OS TCAM) supports the IBM 3270 Information Display System in either local or remote applications. TCAM is used to control data transfer between main storage and local or remote display stations.

The Virtual Telecommunications Access Method (VTAM) supports the 3270 in local or remote applications. VTAM directs transmission of data between application programs and terminals in a telecommunication network that uses BSC or SDLC line discipline. For more information about VTAM, see *Introduction to VTAM*, GC27-6987.

For a description of OS TCAM, see *OS TCAM Concepts and Facilities*, GC30-2022.

BTAM Under DOS or OS

Functions and Organization

The primary functions of BTAM under the Disk Operating System or the Operating System are channel program generation and, optionally, buffer management and 2260-3270 basic data stream translation (see Chapter 6).

When the application program (also called the problem program) is assembled, BTAM macro instructions are expanded into (1) BTAM routines; (2) inline instructions, including linkages to executable BTAM routines; and (3) control blocks and tables defining lines, terminals, and options to be used. During execution, the application program communicates with DOS/BTAM or OS/BTAM through BTAM macro instructions and BTAM control blocks and tables in order to request such telecommunications services as preparing lines for use, performing data transmission, and managing buffers.

Environment

BTAM operates under control of the Disk Operating System or the MFT, MVT, or VS versions of the System/360 Operating System.

BTAM under DOS or OS can be used in telecommunications systems that contain many different control units and devices, including those that make up the 3270 display system.

The 3270 Display System and BTAM Under DOS or OS

BTAM under DOS or OS supports the control units, displays, and printers that make up the 3270 display system. DOS/BTAM support for the local 3277 display stations is comparable to DOS/BTAM support for the local 2260. DOS/BTAM and OS/BTAM support for the remote 3277 and 3275 display stations is part of BTAM support for nonswitched multipoint lines that use binary synchronous communication (BSC). Support for the local or remote 3270 display stations or both can be included among the DOS/BTAM or OS/BTAM routines and channel programs.

Functions and Use

BTAM under DOS or OS supports the 3270 display system by:

- Generating channel programs.
- Translating data streams for 2260 processing routine.
- Starting I/O operations.
- Handling attentions.
- Handling line interrupts.
- Performing error recovery procedures, posting, and counting errors.
- Converting data streams for 2260 processing routines (see Chapter 6).

For local 3270 display systems, capabilities of the display system are used through the "optype" operand of the DOS/BTAM or OS/BTAM READ and WRITE macro instructions. For remote 3270 display systems, a combination of DOS/BTAM or OS/BTAM READ and WRITE macro instructions for BSC and device control characters included in the data to be transmitted provides access to the display system capabilities.

3270 Display System Capabilities Supported

BTAM under DOS or OS supports the following capabilities of the 3270 display system:

- Write data to display or printer buffer.
- Erase buffer and write data.
- Erase all unprotected fields in buffer.
- Read data from buffer.
- Read buffer from specified location.
- Read modified fields from buffer.
- Read modified fields from buffer from specified location.

3270 Display System Devices Supported

BTAM under DOS or OS supports the following 3270 display system devices:

- 3277 display station, model 1, attached to a 3272 control unit, model 1 or 2, or a 3271 control unit, model 1 or 2.
- 3277 display station, model 2, attached to a 3272 control unit, model 2, or a 3271 control unit, model 2.
- 3275 display station, model 1 or 2.
- 3284 printer, model 1, 2, or 3.
- 3286 printer, model 1 or 2.

Environment

BTAM under DOS operates in any System/360 or System/370 processor that has at least 32K bytes of main storage. BTAM under OS requires a System/360 or System/370 processor that has at least the minimum main storage requirement for MFT, MVT, or VS.

In addition to the minimum requirement of 5K bytes for BTAM under DOS, main storage requirements are:

1. Approximately 3K bytes for support of the local 3270 display system.
2. Approximately 7K bytes for support of multipoint lines using BSC, which includes support for the remote 3270 display system.

For BTAM under OS, main storage requirements are:

1. Approximately 5K bytes for support of the local 3270 display system.
2. Approximately 9K bytes for support of the remote 3270 display system.
3. Approximately 11K bytes for support of both the local and remote 3270 display systems.

TCAM Under OS

Functions and Organization

TCAM under OS controls the transfer of messages between TCAM and application programs, and provides a high-level message control language. TCAM macro instructions can be used to construct a message control program that controls messages between remote stations and between remote stations and application programs.

The data set definition and control information macro instructions are used to specify the installation's equipment configuration and the buffers necessary for message processing. Functional macro instructions are used to select TCAM logic modules that route messages, edit messages, and check for message errors. TCAM can be tailored to application requirements through selection of the appropriate macro instructions and operands.

A teleprocessing control system created with the TCAM message control language can:

- Establish contact and control messages between the computer and local or remote display stations.
- Delete and insert line control characters automatically.
- Assign, use, and free buffers as required during execution.
- Edit incoming and outgoing messages.
- Forward messages to display stations and application programs.
- Provide message error handling.
- Maintain statistics about message traffic.

Environment

TCAM operates under control of the Operating System. OS TCAM can be used in telecommunication systems that include the IBM 3270 Information Display System.

3270 Display System and OS TCAM

OS TCAM supports the 3270 display stations, control units, and printers. The support includes the following features:

- Device scheduling under control of a TCAM message control program provides either general or specific polling, dynamically selectable with TCAM operator control.
- The TCAM SCREEN macro extension allows the user to select the command to be executed when writing to a display.
- The TCAM online test capability for the 3270 enables concurrent diagnostic testing on one control unit while other control units on the line continue operations.
- TCAM provides error-handling, recording, and user notification of asynchronous errors.
- TCAM application programs may be written without concern for local or remote attachment of the 3270 display stations that are supported.

3270 support requires 2K additional bytes for the TCAM message control program. TCAM message handlers must also be coded to process the 3270 data and control blocks.

VTAM Under OS/VS and DOS/VS

Functions and Use

The Virtual Telecommunications Access Method (VTAM) directs transmission of data between application programs in the central computer and devices, such as terminals, in the telecommunication network. Because VTAM operates with the 3704 and 3705 Communications Controller, communication lines and controllers need not be considered in coding application programs.

Basic services performed by VTAM include:

- Establishing, controlling, and terminating access between the application programs and the devices.
- Moving data between application programs and the devices.
- Permitting application programs to share communication lines, communication controllers, and telecommunication devices.
- Permitting the telecommunications network to be monitored and altered.

VTAM has features that establish it as a base for building large and small telecommunications systems. These features are:

- Sharing of network resources, which reduces line costs and makes the network more efficient.
- Concurrent execution of TCAM and VTAM application programs, using the same telecommunications network.
- Services required for interactive applications (online inquiries and updates).
- Operation with the IBM 3704/3705 Communications Controller to reduce the number of functions performed in the central computer for remote devices.
- Modular design for tailoring to user needs.
- Reconfiguration of the network without regenerating the system.
- Reliability, availability, and serviceability aids to assist in maintenance.

3270 Devices Supported by VTAM

VTAM supports the following 3270 devices under DOS/VS, OS/VS1, and OS/VS2:

- 3277 display station, model 1 or 2, attached locally to a 3272 control unit, model 1 or 2; attached on an SDLC line to a 3271 control unit, model 11 or 12; attached on a BSC line to a 3271 control unit, model 1 or 2.
- 3284 printer, model 1 or 2, attached locally to a 3272 control unit, model 1 or 2; attached on an SDLC line to a 3271 control unit, model 11 or 12; attached on a BSC line to a 3271 control unit, model 1 or 2.

- 3286 printer, model 1 or 2, attached locally to a 3272 control unit, model 1 or 2; attached on an SDLC line to a 3271 control unit, model 11 or 12; attached on a BSC line to a 3271 control unit, model 1 or 2.
- 3288 printer, model 2, attached locally to a 3272 control unit, model 2; attached on an SDLC line to a 3271 control unit, model 12; attached on a BSC line to a 3271 control unit, model 2.
- 3284 printer, model 3, attached on an SDLC line to a 3275 display station, model 11 or 12; attached on a BSC line to a 3275 display station, model 1 or 2.

Environment

VTAM complements advanced hardware and software, including System/370 virtual storage, the IBM 3704 and 3705 Communications Controllers, DOS/VS, OS/VS1, OS/VS2, and the IBM Virtual Storage Access Method (VSAM). VTAM can be used in telecommunications systems that contain many different devices, including those that make up the 3270 display system.

DISPLAY CONSOLE SUPPORT

Display consoles are operator's consoles that present the operator's message traffic on the screen of a display instead of printing it on paper. Device Independent Display Operator Console Support (DIDOCS), which is a programming service under multiple console support (MSC), provides uniform services for all display consoles on MFT, MVT, and VS2 systems. Status Display Support (SDS) improves the existing system status display services under MFT, MVT, and VS2. Extensions to DIDOCS and SDS provide services for 3270 display stations and printers and also provide several new functions applicable to all devices serviced by the support.

Functions

Basic Display Console Support

DIDOCS provides the linkage between displays and the system to make the displays usable as operator consoles. In conjunction with multiple console support, DIDOCS provides processing and routing of messages from the operating system and problem programs to the consoles, presentation of the messages within the appropriate area of the console screen, and processing of information entered through the console by the operator. The support is device-independent in that it services all devices in a similar manner; on the other hand, it takes advantage of features that are peculiar to a particular console (for example, selector pens and audible alarms).

The additions to DIDOCS for the 3270 display system extend this basic console support to include locally attached 3270 display stations and printers. The 3277 display station, model 2, is made available as a full-capability console or as an output-only console, and the 3277 display station, model 1, is made available as an output-only console. Output-only consoles can be used to display system messages but cannot be used to enter information into the system.

DIDOCS is also extended to include the 3284 and 3286 printers, models 1 and 2, as hard-copy consoles (output-only consoles that produce typed pages instead of screen displays).

Status Display Support is designed to improve system status display services for display and nondisplay consoles. Status displays are formatted, multiple-line displays of system information written to the operator's console in response to certain operands of the DISPLAY and MONITOR commands. The operator uses status displays to monitor system activity and to determine the status of various system devices.

New Console Support Functions

At the same time that display console support is extended to include the local 3270 display stations and printers, new functions are added to DIDOCS and to existing system status display services to increase the general efficiency of all display consoles.

The new DIDOCS functions are in four areas.

Programmed Function Keyboard Command Entry. The programmed function keyboard (PFK) is made available for rapid entry of operator commands. One or more commands may be associated with each PFK key after initial program load, and the operator can enter commands by pressing the appropriate key or keys.

Selector Pen Command Entry. This service is related to the PFK service described above. Commands are again associated with PFK key numbers after initial program load, but command entry is accomplished by positioning a selector pen over key numbers displayed on the screen. This feature is available on all display consoles equipped with a selector pen (except the 3277 display station, model 1); a program function keyboard is not required.

Transient Display Control Modules. Display control modules (DCMs) can require large amounts of main storage in a system with many display consoles. The transient DCM service added to DIDOCS allows several consoles to be grouped together during system generation, so that one area of main storage may be assigned to the group.

While the system is operating, DIDOCS moves the display control module associated with each console into this main-storage area as it is needed. By means of this feature, the main storage required by a group of consoles can be reduced to just slightly more than the main storage formerly required by a single console (see "Storage Requirements").

Pageable DCM Support. Under VS, transient DCMs are replaced by pageable DCMs. Pageable DCMs reside in virtual storage whenever they are not needed; when they are needed, they are brought into real storage by the VS paging facility.

Output-Only Mode of Operation. The 2260 display console, the 3277 display station, model 2, and the 3277 display station, model 1, can be put in the output-only mode of operation during system generation or after initial program load. An output-only console can be used to display operator messages but cannot be used to enter information into the system. Removing the input function from a console adds several lines to the message area on the screen (see "Physical Features") and provides a separate display screen that might be used for special purposes, such as presentation of status displays.

The 3277 display station, model 2, and the 2260 display console operate in either the input/output or output-only mode. If they are designated for input/output operation during system generation, they can be varied to output-only mode by the operator. The 3277 display station, model 1, operates only in the output-only mode and can only receive general message traffic; it cannot be designated to receive status displays.

The primary purpose of Status Display Support is to improve system status display services by enhancing the way information is presented to the operator. These improvements are in three areas.

Contiguous Status Displays. The system WTO macro facility (the WTO macro is used to write the lines of the status display to the operator's console) is extended to allow presentation of status displays in contiguous, multiple-line format. This eliminates interleaving of other operator messages with the lines of the status display.

Display Area Designation. A means of separating status displays from normal message traffic and routing them to separate consoles is provided. The operator (or the system programmer during system generation) can designate blocks of lines in the screen's message area as "display areas" for presentation of status displays. The system assigns an alphabetic identifier to the designated display areas and also assigns a numerical identifier to each console in the system. The operator can use these identifiers to specify the precise console and display area in which a status display is to be presented.

Time-Interval-Updated Display. The operator's ability to monitor system activity is enhanced by the addition of time interval updating of the active jobs displays. The A operand of the MONITOR command requests the active jobs display (the same display that is requested by the DISPLAY A command), but also requests that the system update the display each time a pre-set time interval elapses. The time interval can be adjusted by the operator according to his requirements.

Advantages and Limitations

The advantages of the display console are speed, efficiency, and clear presentation of information.

The system can fill a display screen with information almost instantly, expediting the presentation of information to the operator.

Certain display consoles (Table 5-1) allow present command entry by selector pen or PFK. This form of entry, which enables the operator to enter several

Table 5-1. A Summary of Display Devices and Features That Are Serviced by DIDOCS and SDS

Device \ Feature	Input/ Output	Output-Only	Selector Pen Message Deletion*	Selector Pen Command Entry*	PFK Command Entry*	Audible Alarm*	Intensified Warning Line
2250 Models 1 and 3	Yes	No	Yes	Yes	Yes	Yes	No
2260 Display Console	Yes	Yes	No	No	No	No	No
Model 85, Model 165, and Model 168 Operator Consoles	Yes	No	No	No	No	Yes	No
Model 91 and Model 195 Operator Consoles	Yes	No	Yes	Yes	Yes	Yes	No
3277 Display Station, Model 2 and the Model 158 console	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3277 Display Station, Model 1	No	Yes	No	No	No	No	Yes

*When the required equipment is attached.

commands with one action (positioning a selector pen or pressing a PFK key), is faster than command entry on typewriter consoles and is not subject to typing errors.

Display consoles present different types of information in separate areas of the display screen (see "Physical Features"). Also, the operator may designate a number of contiguous lines of the message area for status displays. When a status display is not present, these lines are used for system message output. When a status display is involved, the information overlays the system messages in the area. When the status information is removed from the screen, the overlaid messages are restored. If the status display contains more lines of information than can be presented in the predefined area, it is dynamically segmented, and the operator can frame through the information.

The operator can classify items as special messages about the console, warning messages, status displays, or general message traffic simply by their location on the screen. Display consoles keep the operator advised of messages requiring action. Unless the operator specifically deletes action messages, they remain on the screen, marked with an asterisk for easy identification. The system also marks messages for which action has been taken and deletes them automatically when the screen becomes full (if the operator has requested automatic deletion). The operator may also control message deletion himself.

In the output-only mode, the display console can provide an effective system monitoring device separate from the main operator console (in a tape or disk library, for example). Most output-only consoles may be designated to receive either general messages or status displays; the 3277 display station, model 1, can be used as an output-only console, but it cannot receive status displays.

A console designated for status displays might be set up close to the master console to provide the operator with system status information in a convenient location, but away from the normal messages. This arrangement would help the operator by making the status displays easier to read. It could also increase system throughput by freeing space on the master console screen for other messages.

System monitoring with display consoles may also take advantage of the time-interval updating of the display of active jobs. The MONITOR A command can be used to provide the operator with information about the jobs active in the system; the system keeps the information current by updating the display according to a preset time interval.

The 3270 display stations (and other display devices), designated as operator's consoles during system generation, are still available for other display applications. The VARY command is used to reconfigure the consoles for these purposes.

Display consoles involve some limitations and restrictions. They require more control modules and more main storage than typewriter consoles, although this can be eased through the use of transient DCMs (see "Storage Requirements"). The display console screen also requires close operator attention, particularly because of the message deletion requirements, although automatic message deletion and the audible alarm can help in these areas (see "Operating Procedures" and Table 5-1).

Environment

System Requirements

The support (DIDOCS) required to operate the 3270 display stations as display consoles can be used with any central processor in which the MFT, MVT, or VS2 versions of the Operating System operate. In order to use display consoles, multiple console support (MCS) must be included in the system. Status Display Support is an integral part of Operating System with MFT, MVT, and VS.

Devices Supported

Table 5-1 contains a summary of the display consoles that are supported by DIDOCS and the special features of each.

DIDOCS Storage Requirements

The processing modules of DIDOCS operate from the SVC transient area (unless the user specifies otherwise). They will require no additional resident storage in the system. The display control modules (DCMs), which support display consoles, are control blocks that require varying amounts of main storage, depending on the type of console they are supporting. The DCM main-storage requirement for each type of console is provided in Table 5-2 (K equals 1024 bytes of main storage).

Table 5-2. DCM Main Storage Requirements

Console	Storage Required
2250, Models 1 and 3	5.0K
2260, Model 1	1.5K
Display Console for Models 85, 165, and 168	3.5K
Display Console for Model 91 and Model 195	5.0K
3277 Display Station, Model 2 and Model 158 Console	3.0K
3277 Display Station, Model 1	1.1K

If the transient display control module feature is not used, separate main-storage areas must be assigned to each console in the system. The total amount of main storage required to support the system consoles therefore equals the sum of the storage requirements for each console plus 36 bytes for each console. For example, a system with a Model 85 display console, a 2260 display console, and a 3277 display station, model 2, needs 8300 (3.5K+1.5K+3.0K+108) bytes of main storage for display consoles.

Transient Display Control Modules. The transient DCM feature allows DCMs to reside in auxiliary storage and to occupy main storage only when they are used. The system assigns to a group of consoles enough main storage to service the console with the largest individual storage requirement (Table 5-2) plus 8 bytes. The system also requires 50 bytes of main storage for each console in the group and 384 bytes of main storage for the access method (BTAM) that is used to transfer the DCMs between auxiliary storage and main storage. If the three consoles used in the example above were assigned to a transient DCM area, the system would require about 4K (3.5K+8+150+384) bytes of main storage.

Pageable DCM Support. Under pageable DCM support (VS only), the DCMs for each active console reside in virtual storage. When the system requires the DCM for a console, the DCM is "paged" into real storage. When it is no longer required, it is "paged" out of real storage and returns to virtual storage.

PFK Command Entry. The system requires no more than 150 bytes of main storage for each PFK associated with commands. The size of the storage utilization block is not affected by PFK support.

Status Display Support Storage Requirements

Status Display Support requires only a minimal increase in the storage required for the Master Scheduler and Communications Task resident areas. The amount is variable according to the system options that are specified (MFT, MVT, MCS, Non-MCS), but the maximum is not more than 1200 bytes. The system also required some main storage to keep track of time-interval-updated displays, display areas, and console information. The maximum requirement is approximately 100 bytes of main storage for time-interval-updated displays, 32 bytes for each display area, and 30 bytes for each console in the system. The user cannot alter the storage requirements; the system automatically includes the required storage according to the options that are specified.

An increased amount of Write-to-Operator message buffers may be required by systems using display areas and time-interval-updated status displays. The number of buffers required varies according to the number of display areas defined and the number of display areas to be used for time-interval-updated displays.

Physical Characteristics of 3270 Display Stations Used as Display Consoles

The device-independent feature of DIDOCS maintains a high degree of similarity among all display consoles. Operators already familiar with other display consoles will find that the 3277 display stations follow the same general format for physical presentation of information. Operators accustomed to typewriter consoles should find the display presentation clear and easy to read.

Screen Format for the 3277 Display Station, Model 2

The appearance of the display screen for the 3277 display station, model 2, in the input/output and output-only modes, is shown in Figure 5-1. In the input/output mode of operation, the 24 lines of the screen are used as follows:

Message area	– 19 lines for messages.
PFK display line	– one line for display of PFK numbers (for selection using the selector pen).
Instruction line	– one line for display of error or operating instruction messages relating to control of the console.
Entry area	– two lines for entering commands.
Warning line	– one line for warning messages (intensified).

In the output-only mode, the message area is expanded to 23 lines.

Line Format for the 3277 Display Station, Model 2

The lines on the 3277 display station, model 2, are 80 character positions in length. Message area lines have system indicators in the first two positions, which appear blank on the screen. Positions 3 and 4 contain the message line number. Positions 5 and 6 may be blank or may contain indicators noting that action is required or has been taken. The message text is contained in positions 7–78. Messages longer than one line are divided at a blank space or comma after the 71st character position; if no comma or blank is found, the message is written to character position 78. The message is continued at position 7 of the next line.

Entry area lines have a blank in the first screen position; positions 2–80 are used for command entry.

In the output-only mode, lines 1–23 are in the format used for the message area, and the warning line is intensified.

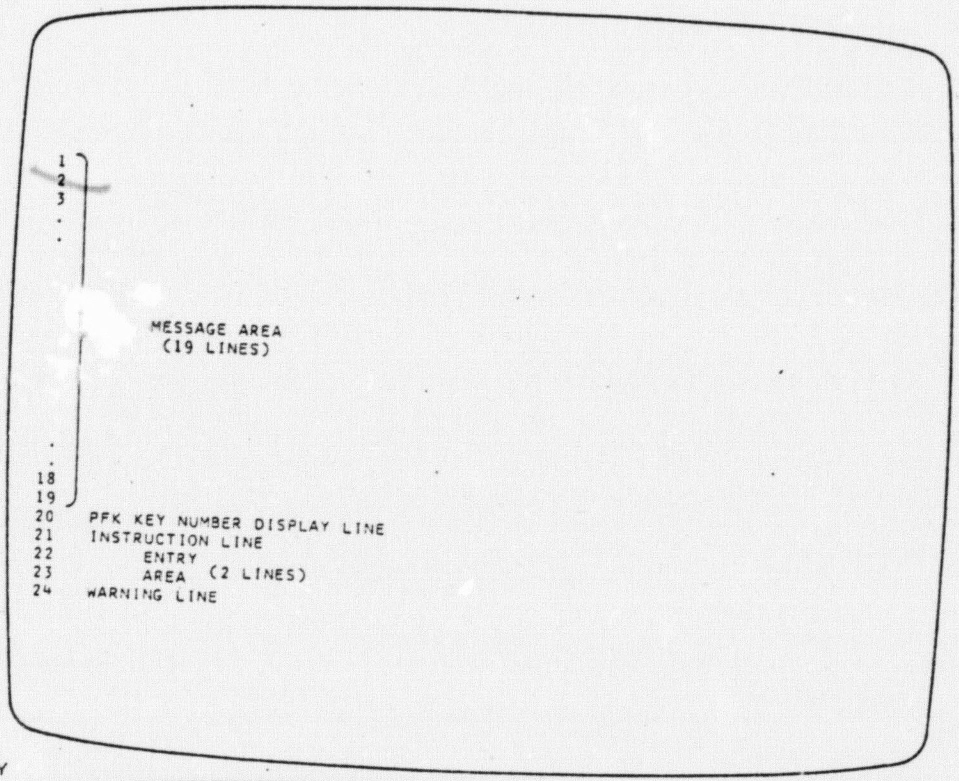
Screen and Line Format for the 3277 Display Station, Model 1

The 3277 display station, model 1, has an 11-line message area and one warning line. Each 40-character line has an asterisk in position 1 when an action is required; otherwise, position 1 is blank. Message text is contained in positions 2–40 of the first 11 lines. Messages longer than one line are continued at character position three of the following line. (Messages longer than two lines are continued on the third line.) Warning messages are printed in positions 1–39 of the warning line; position 40, which contains system information, appears blank on the screen. The warning line is intensified.

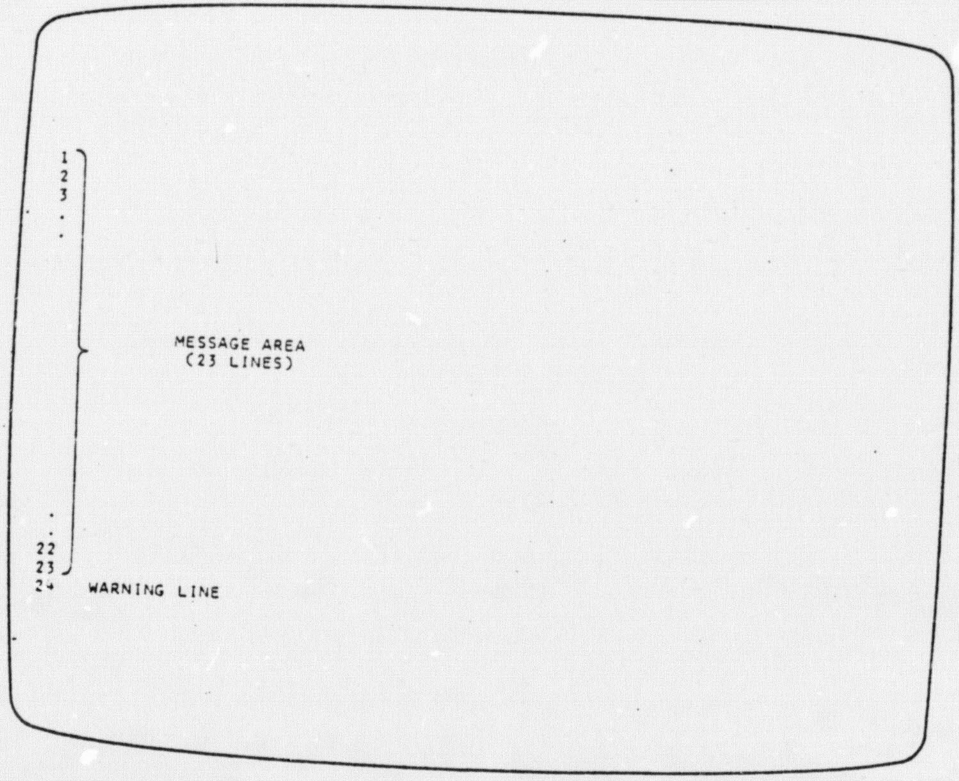
System Procedures

Certain specifications must be made during system generation in order to establish the 3270 display consoles in the system. The operator may change these basic speci-

INPUT/OUTPUT
MODE


1
2
3
MESSAGE AREA
(19 LINES)
18
19
20 PFK KEY NUMBER DISPLAY LINE
21 INSTRUCTION LINE
22 ENTRY
23 AREA (2 LINES)
24 WARNING LINE

OUTPUT-ONLY
MODE


1
2
3
MESSAGE AREA
(23 LINES)
22
23
24 WARNING LINE

Note: These diagrams indicate how the display-screen lines are used in the two modes of operation; the labels shown do not appear on the screen.

Figure 5-1. Screen Formats for 3277 Display Station, Model 2

fications after initial program load to arrange the consoles in what he finds to be their most useful configuration. This section outlines the specifications required during system generation and introduces the basic procedures involved in operating display consoles. Detailed information about system generation is contained in *IBM System/360 Operating System: System Generation*, GC28-6554 and *OS/VS System Generation Reference*, GC26-3791; display console operating procedures are fully explained in *IBM System/360 Operating System: Operators Guide for Display Consoles*, GC27-6949 and Operator's Library: *OS/VS Display Consoles*, GC38-0260.

System Generation

Specification is required in the following areas:

- Multiple Console Support: This option under the SCHEDULR macro instruction is required to use display consoles.
- Console Designation: Each console must be specified under the SCHEDULR or SECONSLE macro instruction. This specification, combined with the multiple console support specification, provides the basic DIDOCS services for the console.
- Output-Only Consoles: Operands of the SECONSLE macro instruction allow specification of output-only consoles.
- Transient Display Control Modules (MFT and MVT only): This service is selected by means of the OPSTRAN operand of the SCHEDULR and SECONSLE macro instructions. If transient DCMs are used, the DCM library must be included in the system by means of the DCMLIB macro instruction.
- PFK Command Entry: This feature is selected by means of the PFK operand of the SCHEDULR and SECONSLE macro instructions. PFK keys may be associated with commands by the operator after initial program load.
- Selector Pen Command Entry: This function is also selected by means of the PFK operand of the SCHEDULR and SECONSLE macro instructions. Key numbers may be associated with commands by the operator after initial program load.
- Hard-Copy Consoles: The 3284, 3286, and 3288 printers may be designated as hard-copy consoles by means of the SECONSLE macro instruction.
- Display Areas: Display areas may be specified by means of the A operand of the SCHEDULR and SECONSLE macro instructions. Display areas may also be specified by the operator after initial program load.

Operating Procedures

The new operator or the operator trained on typewriter consoles should have little difficulty learning to work with display consoles. The procedures the operator is required to perform may involve altering the operating modes of the consoles or controlling the system.

Altering Console Configurations. The basic configuration of consoles is set during system generation. The operator should be aware of this original configuration and of the capabilities of each console in the system. He should know, for example, which consoles have been designated for input/output mode of operation and which have been designated for output-only operation. He can use the DISPLAY and CONTROL commands to keep informed of the configurations, and he may make alterations in the following areas:

- Mode of Operation: The VARY command can be used to make a display console available for other display applications; the CONTROL command can be used to change a console from input/output mode of operation to output-only mode (for either general messages or status displays) or from output-only to input/output.
- Message Area Use: The entire message area of a console screen may be used for messages, status displays, or a combination of both. By means of the CONTROL command, the operator may define areas of a console screen for presentation of status displays. Several of these display areas can be defined in one message area.
- PFK Definitions: If PFK support is requested during system generation, the operator can use the CONTROL command to associate commands with the PFK keys. PFK commands can be redefined by the operator at any time after initial program load.

Controlling the System with Display Consoles. During normal system operation, the operator:

1. Enters commands (1) by typing the command and pressing the ENTER key, (2) by typing the command and selecting the word ENTER from the display screen with the selector pen, (3) by pressing a PFK key, or (4) by selecting a displayed PFK number with the selector pen.
2. Requests status displays by means of the DISPLAY command. The operator can request a display for his console or he can use the console to request a display for presentation on another console.
3. Deletes messages. If a display console screen becomes full, the operator must delete nonaction messages and messages for which required action has been taken. The operator deletes messages by using the CONTROL command, by positioning the cursor and pressing the ENTER key, or by using the selector pen. When messages are waiting for screen space, a message appears in the warning line.
4. Replies to Write-to-Operator-with-Reply messages, using the same procedure as for command entry.

Several display console features assist the operator in performing these procedures:

- The CONTROL command enables the operator to request automatic deletion of nonaction messages and messages for which required action has been taken.
- The DISPLAY command enables the operator to request a display of the commands associated with the PFK keys allocated to his console.
- Routing defaults for status displays can be established, so that the operator need not specify console and display area identifiers each time a display is requested.
- Some consoles have an audible alarm that sounds when an action message is displayed, when a message-waiting warning appears, or when an error is made in entering a CONTROL command.

VIRTUAL MACHINE FACILITY/370 (VM/370)

VM/370 is a system control program that manages a single System/370 computing system so that it appears to be multiple computing systems (termed virtual machines) and so that its resources are available to many users at the same time. Each user has at his disposal the functional equivalent of a real, dedicated computing system. The Conversational Monitor System (CMS), a component of VM/370, is a time-sharing system that provides a general-purpose conversational facility that is suitable for program development and problem solving. CMS allows a user to operate his virtual machine from a remote terminal.

VM/370 supports the 3270 display system for use as virtual machine operators' consoles and CMS user terminals. For a description of VM/370, see *IBM Virtual Machine Facility/370: Introduction*, Form GC20-1800. For information about using VM/370 terminal devices, see *IBM Virtual Machine Facility/370: Terminal User's Guide*, Form GC20-1810.

VIDEO/370

Background

In recent years the cost of data entry has risen considerably. Faster computers and printers have been handicapped by the inefficiency of transcriptive data entry (which requires source document handling, the recording and transcribing of data by keypunching, card handling, and card transport).

Distributive data entry, by means of online graphic display units with keyboards for direct entry of data to a computing system, offers numerous advantages over the transcriptive method:

1. Data may be entered at, or closer to, its point of origin rather than in a centralized keypunch shop.
2. Card handling and transport are eliminated.
3. Data may be entered directly from source documents.
4. Turnaround time between source document and residence of data in the computing system is greatly reduced.

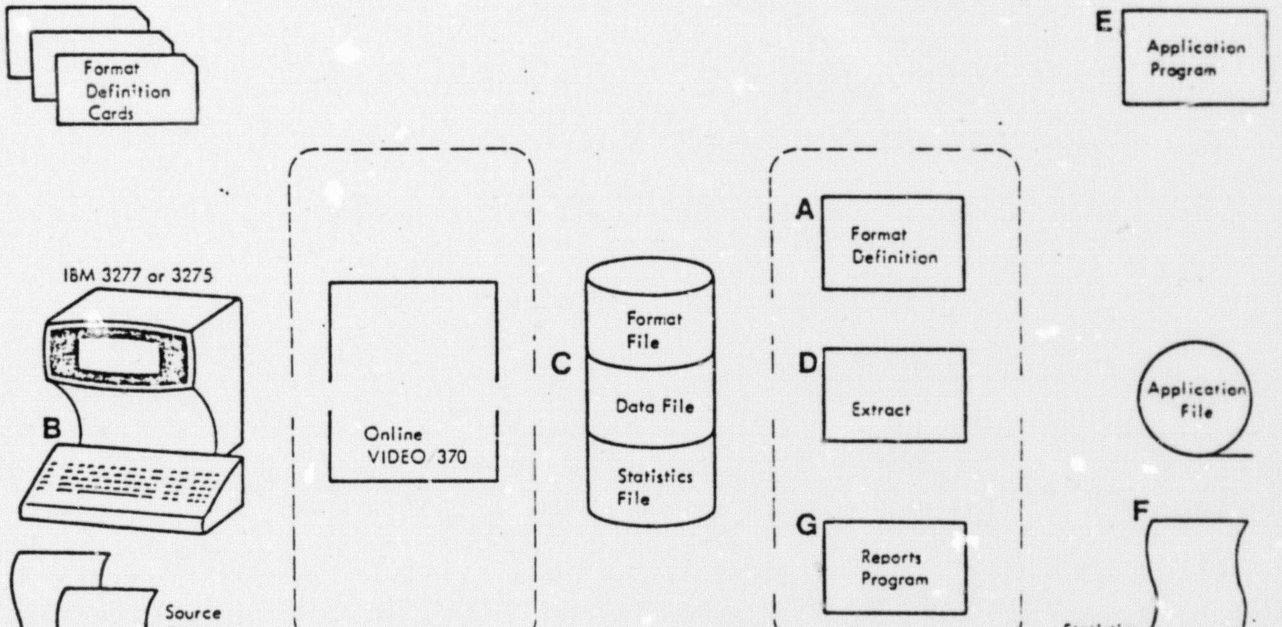


Figure 5-2. Overview of VIDEO/370

VIDEO/370 Overview

VIDEO/370 (Visual Data Entry Online) is a program product designed to provide an easy and direct method for distributive or conventional data entry, using IBM 3277/3275 displays in local and remote environments to produce input for application programs. An overview of VIDEO/370 appears in Figure 5-2. The customer designs the format (A) for the display screen image and application record and defines characteristics for data fields that are checked for errors. If errors are detected in data entry, the operator (B) is able to dynamically correct them. Error-free data is stored on disk (C) for subsequent retrieval (D) and use by the customer's application program (E). Statistics concerning operator production (F) are generated and formatted by the reports program (G).

VIDEO/370 is an improved method of data entry because:

- VIDEO/370 allows data entry by a simple "fill-in-the-blanks" manner, through customer-formatted screen images.
- VIDEO/370 allows installation of local or remote displays, in single units or clusters, with as many terminals and control units as the computing system can support.
- VIDEO/370 provides highly efficient use of storage through its modular, open-ended design.
- Detailed statistics may be produced regarding operator performance and efficiency.
- VIDEO/370 is easy to learn, and minimal operator training is required.
- Input and output formats are flexible and are designed by the customer.
- Costs are reduced due to data editing, early error-detection, and increased operator productivity.
- Diagnostic system messages allow dynamic error-correction by the operator.

VIDEO/370 displays formats that enable an operator to enter source data at the IBM 3277/3275 keyboard directly from source documents and without regard for conventional application record formats. The formats may include field names and instructions so that personnel may use the formats to enter data by filling in the blank areas. For example, a VIDEO/370 display of a customer-designed payroll record format might appear in the format shown in Figure 5-3.

As the operator enters data at the keyboard, the data is displayed within the format on the screen. The data entered on the screen constitutes an operator input record, which is stored on disk for later conversion into the application record format required by the application program.

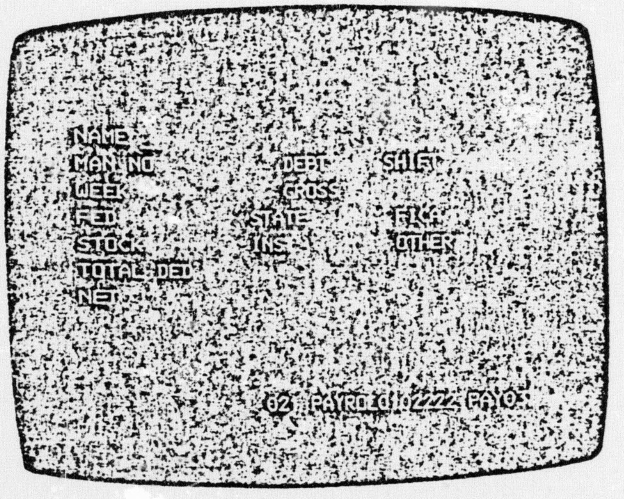


Figure 5-3. S[illegible]le Video/370 Format As Seen on [illegible]277/3275 Display (480-Character Screen)

VIDEO/370 Features and Attributes

VIDEO/370 provides most basic punching and verifying functions, plus the following additional features:

Data Editing and Attribute Specification

VIDEO/370 provides internal editing facilities to ensure the accuracy of operator input data by checking whether all data entered in a field corresponds to that field's format definition. Editing is provided for the following field specifications:

Alphameric (any EBCDIC characters)
Numeric (period, minus, dup, 0–9)
Hexadecimal (0–9, A–F)
Signed (positive or negative integers)
Left and right zero insertion
Left and right blank insertion
Self-check Modulus 10
Self-check Modulus 11

The power shift feature allows specification of automatic lock-up for the shift key for a particular field. Input field length and position characteristics are specified by the customer.

One special editing feature is the use of "balance" fields. Up to four numeric counters can be designated for the accumulation of numeric data for comparison with a predefined total. Any number of numeric fields within a record, or over several records, may be specified as balance fields or total fields. A balance field is added to the contents of a counter, and a total field is compared with the contents of a counter. If the comparison is not equal, the operator is notified and allowed to correct the error. If the fields are equal, the counter is set to zero, and accumulation starts again. In Figure 5-3, for example, the NET (pay) and TOTAL (deduction) fields could be designated as balance fields and added into the same counter for a comparison with the GROSS field (the corresponding total field). VIDEO/370 then makes a comparison for each payroll record as it is entered. In addition, the GROSS field could be added to another counter for all the records that are entered to accumulate a total company payroll. Individual fields may have multiple definitions; that is, a field may be added to more than one balance field and also serve as a total.

The format designer could also provide specialized editing by defining a program to be used with a format. In such a case, this program would be given control after each record was entered and error-checked but before its storage in the file.

Keystroke Reduction

VIDEO/370 enables screen image formats to be defined with automatic duplication fields and automatic skipping between fields. Fields may also be designated as verification or nonverification fields, to reduce the number of keystrokes during verification operations. In addition, constant data may be designated in the format definition as part of the application record so that the operator need not enter such information in the source data.

Easy Error Correction

If the operator detects an error while entering data, he may backspace and correct the error. Also, when an error condition is detected by VIDEO/370, the keyboard is locked to notify the operator, an error message is displayed, and the fields in error are intensified. The IBM 3277/3275 is programmed to automatically skip the nonerror fields.

Data Security

VIDEO/370 provides three methods of improving data security at the display terminal. First, the installation can assign identification numbers to authorized VIDEO/370 operators. Second, the installation can restrict an operator's access to one or more modes of operation. Third, the operator can assign an "access code" to a batch of data; this data cannot subsequently be retrieved without this code.

Operator and Production Statistics

VIDEO/370 has programs that generate and format statistical information, for any specified work period, on operations performed at the IBM 3277/3275 displays. These statistics may appear as five types of reports:

- Operator reports, which provide statistics on all entry and verification operations. One report breaks the statistics down by operator names and includes keystroke counts, elapsed time, number of records and errors, names of formats, and the balance fields for the batch. The second report includes accumulated keystroke count, error count, record count, and elapsed time for all operators.
- Format statistics reports, which provide information to help the installation evaluate its formats. One report breaks down error counts, by field, for each format. The second report lists, by format name, the operator who used the format, the error count, and the number of records entered.
- Production report, which summarizes jobs, keystrokes, time, and records for the period of activity.
- Batch status report, which lists the status of batch jobs that are still active, that is, those entered or verified batches that have not yet been extracted and those that have been saved or suspended.
- Message report, which lists the message codes, a description of the messages, and the total number of times each message was issued.

Flexibility

VIDEO/370 can be tailored to fit each customer's application. The IBM 3277/3275 terminals can be used in any combination, for either entry or verification to balance the workload. Any number of terminals, assigned to either type of application, can be utilized. A verification operation does not have to follow an entry operation within a time limit.

Formats may be defined by the installation to allow input of the data in its source data forms and to allow output that meets the application program requirements. During data entry, the operator can make any number of format changes. The number of records per batch is limited only by the space available on disk. The number of fields per record and the record length are limited only by the physical limits of the display device and the size of the computing system. Multiple application records may be built from one operator input record. Up to 10,000 batches can be stored in each of the user data files, and as many as 99 user data files can be installed, but only one is required.

VIDEO/370 utilizes the flexibility of the IBM 3277/3275 displays. Function keys can be used to enter certain operator commands to minimize keystrokes. When an editing error is detected, the error fields are intensified, and the cursor is positioned at the first error. Incorrect fields are unprotected, while all other fields are temporarily protected so that the Tab key automatically moves the cursor to the next incorrect field.

Checkpoint/Restart

VIDEO/370 will checkpoint the system at intervals specified by the customer. Thus, if the system fails, terminal operators can resume from the point at which the last checkpoint was taken.

Improved Method of Data Entry

With VIDEO/370, data entry is improved because of increased throughput and source editing. Remote displays can be located where the source data is generated to avoid the time and expense of transporting the data to a central system. VIDEO/370 formats can be defined to accommodate source data so that clerical personnel can enter data directly at the display, rather than transferring the data to a separate form to be keypunched. Greater system efficiency results from higher input rates, lower error rates, and the elimination of cards, card-to-tape or disk operations, and card handling costs.

Operation

The VIDEO/370 command system facilitates data entry and error-correction. Function keys on the display and command abbreviations speed command-entry.

To begin VIDEO/370 operations at an IBM 3277/3275 display, the operator enters the ON command with an operator ID.

The operator then chooses a mode of operation: entry, verification, correction, or scan. Each of these modes is established by entering a command with the name of the operation.

Entry Mode

The operator issues the ENTER command to begin data entry. After this command is entered, instructions on the display allow the operator to enter any of the following: a name for the batch to be entered, an authorization code (if required by the installation for the batch), a data file number on which the batch data is to be stored, a sequence number to be associated with the batch, and up to four format names to be associated with the function keys. VIDEO/370 then obtains storage for the batch and creates a unique batch number to be used for future reference to the batch. The installation determines the initial batch size; however, an overflow mechanism allows any number of records to be entered in a batch (within the limitation of available auxiliary storage).

The operator may either specify the first format to be used or allow VIDEO/370 to supply one defaulted from the batch name. When the operator is ready to enter data, this operator input record format, initialized for input data, is displayed on the screen. After the data is entered, the operator presses the ENTER key, and VIDEO/370 transfers the input data to a specified data file. The display screen is then cleared, and the same record format, reinitialized, is automatically displayed for the next record.

Verification Mode

To verify a batch of previously entered data, the operator enters the VERIFY command. Instructions on the display request entry of the batch name, the authorization code (if one was used to enter the data), and up to four format names (which may be associated with function keys), if desired. The display screen is then initialized with the first format selected by the operator. The operator can enter data for all fields, but only those fields that were defined for verification operations in the format definition are used for comparison during the verification.

When an error is detected, the operator is notified, and copies of the original data and the verification data are alternately displayed on the screen until the error is corrected. When the error is corrected, VIDEO/370 replaces the erroneous data with the correct data. This procedure eliminates the extra steps normally required when an erroneous record must be returned to a card punch and rekeyed.

Correction Mode

If the operator is unable to correctly enter a record he may mark the record for later examination. Correction mode is established with the CORRECT command to make the necessary corrections. The operator selects a previously entered batch, and the marked records are displayed one at a time. The operator may delete the records, re-mark them, or correct them.

Scan Mode

The SCAN command establishes scan mode, allowing the operator to display records from any previously entered batch and alter them using the command language. Records may be inserted, marked, revised, or deleted at any point within the batch.

Other Command Functions

In addition to the mode commands described previously, the following special function operator commands are available:

FORMAT: At any time during data entry, the operator may select a different format, either by entering the FORMAT command or by use of a function key. The next record will be entered under control of the new format, without interrupting the flow of data.

MARK: If illegible, incorrect, or incomplete source data records are encountered during data entry, the operator may enter these records and mark them for later correction by issuing the MARK command. Marked records can then be modified or deleted later, in correction mode, which automatically pages to marked records.

AUTO DUP CHANGE: This command, or the appropriate function key, allows the operator to make changes in a field that has been specified for automatic duplication.

SAVE/RESTORE: These two commands are used when entry or verification operations must be interrupted. The SAVE command automatically stores the current data and all relevant batch status information needed to resume work on the batch at a later time. The RESTORE command, used in conjunction with ENTER or VERIFY to establish mode, allows resumption of the interrupted operation. It formats the display screen with the last operator input record that was successfully entered or verified and displays with it the batch name, the format name, and the record number. After this information is displayed for review, VIDEO/370 formats the display screen, ready for the next operator input record.

INSERT/DELETE: These two commands enable the operator to insert or delete records at any point in a batch. INSERT instructs VIDEO/370 to insert the currently displayed record, which the operator just entered, in the position after the previously displayed record in the batch. INSERT may be used to enter a record that was omitted or to add new records. DELETE removes the displayed record from the batch.

CANCEL: The CANCEL command causes the data entered in the current mode to be lost. In entry mode, all data is lost. In verification mode, the batch status reverts to that of an unverified batch.

UPDATE: The update facility enables the operator to modify previously entered records. For example, if the operator wishes to review a record while entering data, he may page back to it and then update it, if necessary.

PAGEF/PAGEB: These commands allow the operator to move forward or backward by a single record or by several records within a batch. For example, an operator who is viewing the first record of a batch and wants to view the fourth may enter PAGEF,03 to page forward three records. Program access keys may be used for rapid single-record paging.

RETURN: The RETURN command allows the operator to end a paging operation.

ACCEPT: During the verification procedure, when the correct record is displayed, the operator enters the ACCEPT command and that record is entered in the batch.

RETRY: This command erases all unprotected data in the input fields on the display. The format remains, and the operator can enter a new record.

END: This command ends the current mode of operation. The display station is then available for the next operation.

TERMINATE: This command begins the VIDEO/370 timed-shutdown procedure. The operator who issues the command, with the correct installation-defined password, must sign off. All other displays operating under VIDEO/370 receive a message requesting that they sign off. After an interval (specified by the installation), the outstanding operations of any terminals that do not respond are saved.

OFF: The operator completes a mode of operation with the END, SAVE, or CANCEL command. To end all VIDEO/370 operations at the IBM 3277/3275 display, the operator enters the OFF command.

The VIDEO/370 operator has six additional commands that provide special assistance:

DISPLAY: This command allows the operator to view any format that has been defined for the VIDEO/370 system. The format is displayed as a representation of its characteristics: field types, length, positions, and editing features (such as balance fields or Modulus 10 fields).

STATUS: Upon receipt of this command, VIDEO/370 displays the following information about the designated batch: the batch name, the names of predefined formats, the values of balance fields, the mode of operation, whether the batch has an access code, whether there are marked records, the status of the batch, and whether the batch is active.

HELP: This command may be entered by the operator in response to an operator message that is issued by VIDEO/370. It displays the message ID associated with the displayed message so that the operator can refer to documentation about the message.

ROUTE: This command allows the operator to communicate with the system operator's console. One line (64 characters) is written to the operator's console each time this command is issued. ROUTE can be issued without interrupting VIDEO/370 operations.

RESCUE: If trouble occurs at another display station, the batch may be saved by using the RESCUE command from another display station. The batch may be resumed after the display station is repaired or from another display station.

RESTART: If VIDEO/370 ceases operation before normal termination, a display station operator whose batch was interrupted can use the RESTART command to enable restoration of the batch.

Environment

Software

VIDEO/370 executes under the Operating System or Disk Operating System, utilizing both local and remote IBM 3277/3275 display units in a BTAM environment. VIDEO/370 is started by job control language (JCL) statements. There are three VIDEO/370 support programs, which are offline and initiated by standard JCL for background processing:

- Format Definition Program, for which input cards are defined by the installation to describe each format that will be used for data entry. Formats are stored in a format file on disk, for reuse and quick access.
- Extract Program, which moves data from the VIDEO/370 file to an application file. This program may be run at the same time as online VIDEO/370. It supports fixed, variable, blocked, or unblocked output record

formats for the customer's sequential output data set. One or more batches may be combined to produce output data. Data is converted to the record format required by the application program. During extraction, sequence numbers can be added to the records, and records can be arranged in any desired output format, including several application records for each operator input record. The extract program allows exit to a customer program associated with the format. If used, the customer program is entered before each record is written into the application file.

- Reports Program, which compiles information during any specified work period to provide comprehensive statistics on operator performance at all the IBM 3277/3275 displays. These statistics enable the installation to evaluate its format usage, operator performance, and system efficiency and to identify operational problems. The statistics provided by this program can be printed in five different types of reports.

Hardware

VIDEO/370 can be used under OS with System/360 Model 40, System/370 Model 135, or larger processors and under DOS with System/360 Model 30, System/370 Model 135, or larger processors. VIDEO/370 can be used with the IBM 3277/3275 Model 1 or Model 2 display devices, with either typewriter or data entry keyboards.

Storage Requirements

To operate VIDEO/370 under OS requires a minimum machine size of 128K bytes in an MFT system and 256K bytes in an MVT system. DOS requires a minimum of 64K bytes. For planning purposes, the approximate storage figures given in Table 5-3 may be used.

VIDEO/370 allows the customer to select only those options required for his installation, so, in many cases, the VIDEO/370 storage required for a particular customer may fall between the minimum and all-options figures. The main storage required for each terminal is keyed to customer requirements (the figures given assume a typical customer environment), based on the options selected by the customer and the nature of the input.

VIDEO/370 uses the IBM 2311, 2314, 2319, or 3330 disk drive for secondary storage in DOS and any direct-access device supported by BSAM, QSAM, and BDAM in OS for its programs and data entered by the operators. The secondary storage necessary for VIDEO/370 programs depends on the options chosen and the values chosen for the installation variables. A typical 10-terminal system with no options uses no more than 100K bytes of secondary storage for programs. Additional secondary storage required depends on:

- The number of operators.
- The frequency of data extraction.
- The amount of data and size of data records in the batch.
- The number and size of formats.
- The statistics file (optional).

Additional primary and secondary storage depends on the number and size of the customer's exit programs.

Installation Considerations

The IBM 3277/3275 display terminals used for VIDEO/370 are part of a teleprocessing network controlled by VIDEO/370 using BTAM.

VIDEO/370 provides two methods by which the installation may tailor its system. The first is by selecting any

Table 5-3. Storage Estimates for VIDEO/370

	Typical Storage Size for Minimum VIDEO/370 System				Typical Storage Size for VIDEO/370 with All Described Options			
	Program Storage	Each Terminal	Each Control Unit	Each Line	Program Storage	Each Terminal	Each Control Unit	Each Line
OS local	38010	782	510	—	60689	875	510	—
OS remote	46558	763	25	350	69285	860	25	350
OS local & remote	50195	**	**	**	72922	**	**	88
DOS local	40721	775	340	—	63493	850	340	—
DOS remote	49631	775	25	275*	72673	850	25	275*
DOS local & remote	54353	**	**	**	77395	**	**	**

*320 for first line to be defined.

**This figure should be calculated on the basis of local or remote.

combination of optional features, such as commands or editing options. The second is by defining specific display station configurations, data set allocation, buffer size, record size, batch size, and frequency of checkpoints.

The VIDEO/370 installation material is distributed on tape with the JCL to perform the installation. A set of macro instructions designed to assemble certain VIDEO/370 options and control information is included in the material. The installation chooses the optional features it wants by selecting the proper operands for these macro instructions. A basic VIDEO/370 system includes eight operator commands: ON, OFF, ENTER, CANCEL, RETRY, FORMAT, AD (auto dup change), and END. The installation must assemble and link-edit the modules with the preassembled modules in the installation package.

A pre-format program, which is included in the VIDEO/370 package, initializes all the VIDEO/370 data files and batch entry files. It must be run at the time of installation, before the online VIDEO/370 program is started.

Sample programs and input are also included, along with a sample format, a sample customer's exit, and sample input cards for the extract program. The material is designed to help the installation check the VIDEO/370 system and provide a guide for further design.

Access Method Requirements

VIDEO/370 requires BDAM, QSAM (OS only), BSAM (DAM and SAM in DOS), and BTAM.

VIDEO/370 UNDER CICS

General

VIDEO/370 may also be run as an application program under the Customer Information Control System (CICS), which is described in this chapter. Under CICS, VIDEO terminals may be switched to other application programs; they do not have to be dedicated to VIDEO.

VIDEO users can also use the CICS master terminal facility to check and change the status of individual terminals, route messages to the display operators, and enable and disable terminals, control units, and lines.

No system support is required other than that required by VIDEO and CICS. The VIDEO offline programs (file initialization, format definition, extract, batch status, and management reports) operate outside of CICS control.

Highlights of the CICS Feature

VIDEO under CICS offers a number of advantages:

- Terminal Sharing: Terminals are freed from total dedication. Whenever desired, individual terminals may be switched from VIDEO to other application programs under CICS, permitting multiple use of the displays and associated system resources. In addition, an authorized user may initiate online VIDEO execution from any terminal.
- Master Terminal: VIDEO users can have access to the CICS master terminal facility. This facility may be employed for ascertaining and changing the status of individual terminals, enabling and disabling terminals, control units, and lines, routing messages to the entry operators, displaying CICS system statistics, and altering system parameters.
- Sharing of Teleprocessing and File I/O: Under CICS online VIDEO makes use of the I/O facilities of CICS for all its teleprocessing and file operations. CICS' dynamic buffering may result in storage savings, especially in larger (multi-terminal) systems. This may provide a more efficient use of system resources and simplify VIDEO installation.
- System Reliability: Under CICS, each terminal executes as a separate task. Thus, if an individual terminal operation abnormally terminates, only that terminal is affected. CICS, VIDEO, and the other terminals and application programs continue to be operational.
- Statistics for Performance Tuning: Users can use the system statistics produced by CICS to further refine their VIDEO operations.

DATA/360

DATA/360 is a program product that allows OS and DOS users to enter and verify data from local IBM 3277 Model 1 display stations in 2260 mode. Data is entered in fields on the screen, and correct data is sent directly to a disk-storage device. Card-handling is eliminated. Any errors in entry and verification are displayed to the operator for correction. Entered data can be extracted from disk (by a utility program) for use by application programs.

Features

DATA/360 performs most of the functions of the IBM 29 Card Punch and the IBM 59 Card Verifier. These functions include manual and automatic duplication, manual and automatic skip, left- and right-padding with zeros or blanks, verification of selected fields, and automatic duplication override. Any two numeric fields may be used for balancing. If editing errors (e.g., numeric data in an alphabetic field) occur during either entry or verification, the keyboard is locked. The record is displayed with X's over the incorrect fields, and the record can be corrected or entirely rekeyed.

Up to 117 characters may be entered for each record. A record format may contain as many as 24 fields in OS, or 16 fields in DOS, with editing specifications for each field. A collection of related records is called a batch; a document consists of up to 200 related batches. The records of each document can be edited under as many as seven formats. or three formats in DOS, each with its own unique editing characteristics, plus an unedited format. The number of documents is limited only by the amount of available disk-storage space. Formats may be displayed at any time to show field names, length, and editing specifications.

To each field entered under a format a set of editing specifications is applied during editing. A signed numeric field can be specified for balancing, verification, or automatic duplication. A field may be of fixed or variable length. A variable-length field may be justified to the left or right, with zero or blank padding; balance fields may only be padded with zeros. In addition, data can be transferred after editing to a user-written application program for custom processing.

The DATA/360 checkpoint/restart facility allows an operator to resume an interrupted batch with a minimum of rekeying.

Command Functions

DATA/360 commands allow extensive operator control and flexibility.

The primary commands request entry or exit from a mode of operation and allow the operator to perform the following functions:

- Sign on with two initials as identification.
- Request a batch assignment for data entry.
- Ask to verify a particular batch.
- Reverify a previously verified record.
- Cancel the batch currently in progress.
- Save the current batch on the master file to allow later resumption of processing.
- Restart a saved batch.
- Page through a batch during or after entry or verification, to display individual records.
- Display document formats.
- Return to the status that existed before the paging or displaying procedure was initiated.
- Display the status of the operator's display station, including the current document name, the assigned batch number, the operator's identification, the maximum number of records that may be entered, the current number of records entered, the format being used, and the current mode of operation.
- End the current batch.
- Terminate DATA/360.

The secondary DATA/360 commands extend the functions of the primary commands. In response to an editing error, the operator may rekey an entire record or may correct part of the record. One secondary command displays the next six fields of a displayed format. During paging, secondary commands allow the operator to page forward or backward, by one record or (in OS) by a specified number of records. The operator can also insert or delete records while paging. During verification, the operator can use secondary commands to accept the original record or the verification record, to delete the original record, or to rekey the verification record.

Entry of a series of special characters allows the operator to change data in automatic duplication fields or to select a different format.

Environment

Software

DATA/360 operates under either the Operating System (MFT or MVT) or the Disk Operating System. The program is written in Assembler Language and incorporates ISAM, SAM, and BTAM for DOS. OS incorporates BDAM, GAM, and QSAM. A sort/merge program is required for the operator and production statistics utility program.

Utility Programs

DATA/360 has five support programs that are executed offline:

- File load: specifies editing formats and batch sizes, to create and define new files.
- Extract: moves data from the master file to a sequential output file on cards, tape, disk, or at the printer; generates a report of the current status of batches in the master file. Extract allows fields to be arranged in a different sequence from that entered and may be run while data is being entered or verified.
- File transfer: copies active data into a newly loaded master file from a previously active file.
- Analyze: shows the status and content of each batch on the master file.
- Operator and production statistics: provides daily or monthly summaries of operator performance, production, documents, production rates, editing and verification errors, error codes, log details, and system activity.

Hardware

DATA/360 can be used on any System/370; on a System/360 Model 40G, or larger, processor for OS; or on a System/360 Model 30F, or larger, processor for DOS. Up to four control units and a maximum of 128 display stations can be supported.

Because the IBM 3277 Model 1 display station operates in 2260 mode, function keys are not supported, fields may not be protected, and dual intensity is not supported.

Records are entered online to IBM 2311, 2314, 2319, or 3330 direct-access storage devices.

Storage Requirements

DATA/360 under OS requires approximately 36K (including access method modules) for the online program and 1300 bytes for each display station. Each utility program requires approximately 26K of storage.

DATA/360 under DOS requires approximately 28K (including access method modules) for the online program and 714 bytes for each display station, assuming a configuration of 20 display stations and two control units. Each utility program requires approximately 22K of storage.

INFORMATION MANAGEMENT SYSTEM (IMS)

The IMS Version 2 is a program product that uses OS/BTAM to allow IMS applications to operate on the IBM 3270 Information Display System. The 3270 is supported for local and remote applications. Remote display stations require non-switched lines.

For Version 2, applications that run on the 2260 require no change if the input message clearly identifies the format of the next output message. Otherwise a function call to IMS/360 must be inserted in the application program to provide the necessary formatting information before the message is transmitted to the display station.

The format language utility allows the installation to define its message formats and their associated screen image formats. In addition, the format language allows transmission of a message between a logical terminal and an application program without concern for device characteristics.

Storage estimate information is available in *IMS/360 General Information Manual,* GH20-0765.

CUSTOMER INFORMATION CONTROL SYSTEM (CICS)

The CICS, including CICS/OS Standard Version 2, CICS/DOS Standard, and CICS/DOS Entry, uses the 3270 display station in both local and remote environments. CICS provides an interface between the operating system, access methods, and application programs, to allow display station interaction with a data base.

Version 2 includes time management facilities, support for binary synchronous dial-up, PL/I support for CICS/DOS systems, and expanded data base control items (such as file browsing and dynamic file open or close).

INTERACTIVE QUERY FACILITY (IQF)

The IQF under IMS/360 Version 2 is a program product designed to provide spontaneous online information. The simple IQF language is easily learned and allows non-programmers to request information from the IMS/360 data bases. The language can be customized with synonyms and null words to suit particular needs.

Queries are easily prepared, and the online response allows quick followup in response to previous answers without leaving the display station.

TIME SHARING OPTION (TSO)

The TSO of the Operating System can use the IBM 3275 or 3277 display station in both local and remote configurations. TSO application programs may use optional features of the display station as follows:

- The TSO command system uses typewriter mode support for the 3270. The external characteristics of this support are similar to those of TSO/TCAM 2260/2265 support, as described in *TSO Terminals Manual,* GC28-6762.
- The selector pen, program function keys, operator identification card reader, and screen format flexibility can be supported in user-written TSO command processors and TSO application programs using the TGET or TPUT ASIS terminal macro instructions. The 3270 printers are not supported.
- Screen image intensification is used to differentiate output generated by the system (brighter intensity) from user input (normal intensity). Information entered as a password is not displayed.

The TSO message control program requires approximately 1.5K extra bytes to support the 3270 display system. The TSO message handler requires additions to process 3270 data and control blocks.

DATA ANALYSIS WITH VSPC

The Virtual Storage Personal Computing system offers users at remote conversational terminals a choice of responsive tools to meet their needs for personal computing. The resources of the System/370 and VS operating system are apportioned directly to each terminal user for data and source-program manipulation. The user may also submit jobs for batch processing, and retrieve the output at the terminal location.

Chapter 6. Conversion

INTRODUCTION

As previous chapters of this publication have indicated, the 3270 display system provides more functional capabilities and has greater flexibility than the 2260/2848 and 2265/2845 display systems. Therefore, many advantages can be realized by replacing 2260 or 2265 display stations with 3270 display stations. Among the advantages are improvements in:

- Transmission efficiency - because of higher local and remote transmission speeds and data compaction features.
- Operator efficiency - because of cursor controls and editing features.
- Simplicity of operation - because of formatting features.

Advantages such as the many possible configurations, the optional features, and the other added functional capabilities also contribute to the superiority of the 3270 display system.

This chapter is based on the assumption that, for expediency, some customers will at first want to use the 3270 display station in the same way as the 2260 display station is used in existing applications. These customers will enjoy the above-mentioned advantages of the 3270 display system, but the impact on their current application programs will be minimal. They can then take advantage of the added functional capabilities and flexibility of the 3270 display system at their own convenience. This chapter is intended primarily for customers who want to replace 2260 or 2265 display stations with 3270 display stations as quickly as possible and who choose not to take immediate advantage of all the added capabilities of the 3270 display system. For such customers, screen formats and display operator procedures for the 3270 display station should remain as much like existing formats and procedures for the 2260 or 2265 display station as possible.

Customers who require more functional capabilities than the 2260/2848 or 2265/2845 display system possesses should consider redesigning and rewriting for the 3270 display system parts or all of their existing application programs. To help them redesign and rewrite, manuals that describe the levels of programming support for the added capabilities of the 3270 display system will be available. To use the full potential of the 3270 display system, these customers are encouraged to complete this step as quickly as possible. All new applications should be developed with the features of the 3270 display system in mind.

BTAM Data Stream Conversion Macro

A BTAM macro instruction is available to provide basic translation of the output data stream of 2260 processing routines for the 3270 and to reformat the incoming 3270 data stream so that it can be used by the 2260 processing routines.

Assumptions

For a typical installation, the following assumptions can be made about converting from a 2260/2848 display system to a 3270 display system:

- As little reprogramming as possible is to be done. Therefore, changes should be confined to as few routines as possible. The BTAM conversion macro instruction will be used.
- The conversion process will occur in steps. Therefore, during the conversion period, 2260 display stations and 3270 display stations will operate simultaneously for most applications. Since simultaneous operation may degrade performance, conversion to 3270 display stations should be completed quickly.
- It may or may not be necessary to change from one access method to another (GAM to BTAM, for example). If the access method must be changed, access method planning guides will be available.
- It should not be necessary to change from one operating system to another (DOS to OS, for example). (If a change is necessary, operating system planning guides will be available.)

Steps in Conversion

If a change of access method is required, it should be done first. During this step, the 2260 display stations and the application program should, for the most part, remain unchanged.

If a change of access method is not required, the first step should be to replace the 2260/2848 display system with a 3270 display system and to use the 3270 display stations like 2260 display stations; that is, in a simple, unformatted, typewriter-like mode of operation. After this step is complete, uses and requirements for functional capabilities not available to the application program with the 2260 display station (but now available with the 3270 display station) will probably become apparent. The next step is to reprogram the applications, as time permits, to take advantage of the additional capabilities of the 3270 display system.

Application Program Structure and Modification

The typical structure of an application program consists of terminal control routines and processing routines. The terminal control routines, which are a distinct part of the application program, are normally responsible for all device communication or terminal I/O operations. In many cases, all display-device dependencies are handled within the terminal control part, so that these dependencies are transparent to the processing routines. Therefore, in converting the application program, it is the terminal control routines that should be examined for modifications, including use of the BTAM data stream conversion macro instruction to minimize or eliminate changes to the 2260 processing routines. In many cases, modifications to the terminal control routines will cause differences in screen format and input procedures that will be apparent to the display operator.

Summary

The programming changes necessary to replace 2260/2848 display systems with 3270 display systems and to use 3270 display stations like 2260 display stations are usually confined to a few parts of the application program. Redesign of application program logic should be minimal. Slight changes in the orientation of display operators will be required. Customers using program products for their applications should be the least affected.

Customers should approach replacement of the 2260/2848 display system with the 3270 display system in a logical, step-by-step procedure. The remainder of this chapter is intended to help do so.

CONFIGURATION CONSIDERATIONS

Table 6-1 is a general summary of configurations of the 3270 display system; Table 6-2 is a summary for the 2260/2848 and 2265/2845 display systems. Table 6-3 summarizes comparable 2260/2848, 2265/2848, and 3270 display system configurations.

There are two different screen sizes of 3270 display stations. The 3277 and 3275 display stations, model 2, have a screen that displays 24 80-character lines. The 3277 and 3275 display stations, model 1, have a screen that displays 12 40-character lines. The 2260 model 1 and 2260 model 2 display stations have the same screen size; screen capacity depends upon the control unit to which these display stations are attached. The 2260 model 1 displays 12 80-character lines when attached to a 2848 model 3. The 2260 model 2 displays 12 40-character lines when attached to a 2848 model 2 or 22, and it displays 6 40-character lines when attached to a 2848 model 1 or 21.

Table 6-1. 3270 Display System Configurations

Control Unit	Display Station or Printer	Number of Devices on Control Unit	Capacity of Display Station (in Characters)
3272 Model 1	3277 Model 1	1-32	480
	3284 Model 1	0-31	-
3272 Model 2	3277 Model 2	1-32	1920
	3286 Model 2	0-31	-
3271 Model 1	3277 Model 1	1-32	480
	3284 Model 1	0-31	-
3271 Model 2	3277 Model 2	1-32	1920
	3286 Model 2	0-31	-
–	3275 Model 1	1	480
	3284 Model 3	0-1	-
–	3275 Model 2	1	1920
	3284 Model 3	0-1	-

Table 6-2. 2260/2848 and 2265/2845 Display System Configurations

Control Unit	Display Station or Printer	Number of Devices on Control Unit	Capacity of Display Station (in Characters)
2848 Model 1	2260 Model 2	1-24	240
	1053 Model 4	0-1	-
2848 Model 2	2260 Model 2	1-16	480
	1053 Model 4	0-1	-
2848 Model 3	2260 Model 1	1-8	960
	1053 Model 4	0-1	-
2848 Model 21	2260 Model 2	1-24	240
	1053 Model 4	0-1	-
2848 Model 22	2260 Model 2	1-16	480
	1053 Model 4	0-1	-
2845	2265 Model 1	1	960
	1053 Model 4	0-1	-

Table 6-3. Comparable 2260/2848, 2265/2845, and 3270 Display System Configurations

Current 2848 or 2845 Control Unit	Current 2260 or 2265 Display Station or 1053 Printer	Comparable 3270 Display Station or Printer	Comparable 3270 Control Units
2848 Model 1	2260 Model 2	3277 Model 1	3272 Model 1
	1053 Model 4	3284 Model 1	3271 Model 1
2848 Model 2	2260 Model 2	3277 Model 1	3272 Model 1
	1053 Model 4	3284 Model 1	3271 Model 1
2848 Model 3	2260 Model 1	3277 Model 2	3272 Model 2
	1053 Model 4	3286 Model 2	3271 Model 2
2848 Model 21	2260 Model 2	3277 Model 1	3272 Model 1
	1053 Model 4	3284 Model 1	3271 Model 1
2848 Model 22	2260 Model 2	3277 Model 1	3272 Model 1
	1053 Model 4	3284 Model 1	3271 Model 1
2845	2265 Model 1	3275 Model 2 3275 Model 1	—
	1053 Model 4	3284 Model 3	

For local and remote groups and for remote standalone, there are 3270 display stations. The 3277 display stations, models 1 and 2, are attached to the 3272 control units, models 1 and 2, to form local groups. They are attached to the 3271 control units, models 1 and 2, to form remote groups. The 3275 model 1 and model 2 are remote standalone control unit/display stations. There are 2260 display stations for local groups and remote groups. The 2260 model 1 is attached to the 2848 model 3 to form local or remote groups. The 2260 model 2 is attached to the 2848 model 1, 2, 21, or 22 to form local or remote groups.

For a more detailed description of 3270 display system configuration considerations, see Chapter 2. For more detailed 2260/2848 or 2265/2845 display system configuration considerations, see *IBM System/360 Component Description: IBM 2260 Display Station - IBM 2848 Display Control,* GA27-2700, or *IBM System/360 Component Description: 2265 Display Station Model 1 - 2845 Display Control,* GA27-2731.

3270 AND 2260/2848 DISPLAY SYSTEM FUNCTIONAL DIFFERENCES

Some of the major functional differences between the 3270 and the 2260/2848 display systems are noted below. For details on these and other functional differences, compare information in the relevant chapters of the manuals mentioned above.

Line Control

Using BTAM support under DOS or OS, differences between the binary synchronous communication line control used for a 3270 display station and the start/stop line control used for a 2260 display station will be apparent to the application program.

Data Stream

Using BTAM support under DOS or OS, differences between a data stream for a 3270 display station and a data stream for a 2260 display station will be apparent to the application program. The 3270 display system has additional buffer and display control information embedded in the data stream.

Commands and Control Characters

Through various control characters and orders in the output data stream, the 3270 display system Write command can be used to perform the same functions as the 2260 Write DS Buffer, Write DS Line Address, and Write 1053 Buffer Commands. The 3270 Write command can also be used to perform the same functions as the 2260 Erase DS Buffer command. The 3270 Read Buffer command can be used to perform the same functions as the 2260 Read Full DS Buffer command.

The start manual input and new line control characters are unique to the 2260 display station. Because these control characters are essential to the operation of the commands, the 2260 Read DS Manual Input and Short Read Manual Input commands have no directly equivalent 3270 display system commands.

DEVICE CONVERSION

Assuming that access method conversion was unnecessary or has been made, there are several ways of introducing 3270 display system devices into the system without completely rewriting application programs. A simple, 2260-like mode of operating the 3270 display station is suggested below. The changes described are merely an example of the impact of conversion on an existing 2260 application program. Each application program must be examined to determine the exact changes that apply. After new line control is established, some editing is needed to convert input and output data streams. The changes suggested below should affect only the I/O module or modules of the application program and will have little impact on the display operator.

Output Considerations

On output, the message text is scanned, and the following substitutions and additions are performed:

- The start manual input (Start MI) character is replaced by a field separator for an unprotected field.
- A cursor positioning (IC) code is inserted in the first position following the field separator that replaces the Start MI character.
- New line (NL) characters are replaced by start field (SF) sequences placed in the last character positions of the lines for unprotected fields (if the NL character may be entered as data). The first text character following the NL character should be forced to the next line in all cases by using a set buffer address (SBA) sequence.

Input Considerations

On input, the message text is scanned, and the following substitutions and deletions are performed:

- All device control through the first set buffer address (SBA) sequence is deleted, and the message is compacted.
- Each subsequent SBA sequence is deleted, an NL character is substituted (if the NL character may be entered as data), and the message is compacted.

Message Editing

On both output and input, message editing must be done within the application program. One technique for finding the locations that require editing is the use of the Translate-and-Test instruction. The required editing routine should be straightforward if the application program has used Write DS Line Address commands. If the program has used Write DS Buffer commands (so that current cursor position may not be known), but NL characters have not been used, the editing routine remains straightforward. Output conversion is also simple if the data stream is constructed of defined constants with variable areas referenced by symbols; if this is not the case, output conversion may be more complex.

Display Operator Considerations

In conjunction with the changes indicated above, the display operator performs the following operations when entering data:

- Enters data at the cursor location.
- Presses the ERASE EOF key to clear the rest of the field to nulls.
- Presses the ENTER key.

The operator's actions remain essentially unchanged except for the additional requirement of pressing the ERASE EOF key. For most modes of operation, this presents no problem. Even though the "fill-in-the blanks" approach is potentially more difficult, the ERASE EOF key can be used for each field, thus simplifying the total operation. Caution should be exercised if the entire screen has been defined as one field.

Display Operator Reorientation

When using the 3270 display station, the display operator no longer sees the start manual input, new line, and end of message symbols that appear on the 2260 display station.

For a 2260 display station and a 2260 application program, the display operator enters data in a field (if necessary) and presses the NEW LINE key to move to the next field. After this data has been entered, the operator presses the ENTER key. For a 3270 display station and a modified 2260 application program with a data-stream editing routine, the operator enters data in a field (by overwriting either data or blanks) and presses the ERASE EOF and Tab keys to place the cursor in the first character position of the next unprotected field. If no data is required for a field, the operator enters a "no data" character that is recognized by the editing routine.

Unlike the 2260 display station, for which the new line character serves to end a field for input, the 3270 display station sends the total field (including spaces, but excluding nulls). To allow the message processing routines to scan input correctly and to reduce the logic required in the editing routine, the input data length should always equal the length of the data entered. The operator presses the ERASE EOF key after entering data in a field to guarantee that no other data (such as spaces used to fill out the fields, instead of nulls) is transmitted.

SCREEN FORMAT EXAMPLE

With the device-conversion considerations discussed above in mind, a simple example of the step-by-step transition sequence is described below. To illustrate this sequence from the programmer's and the display operator's points of view, both the screen formats and the input and output data streams are shown.

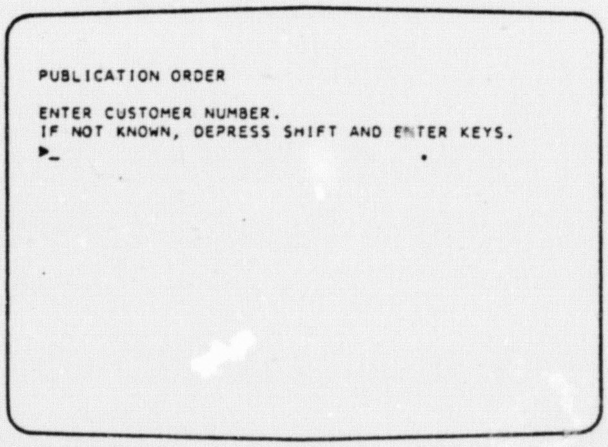
The screen format example chosen is representative of several different operating modes used in transaction processing, including conversation, data selection, free form, sequence key, and code link.

2260 Display Station - Step 1

When the display is initially written (by means of the Write DS Line Address command), it appears as shown in Figure 6-1. The data stream for this display format is:

2260 Output (command in selection sequence remote)

[STX] | Lineno | TEXT | Start MI | [ETX]


```
PUBLICATION ORDER

ENTER CUSTOMER NUMBER.
IF NOT KNOWN, DEPRESS SHIFT AND ENTER KEYS.
▶_
```

Figure 6-1. 2260 (Step 1)

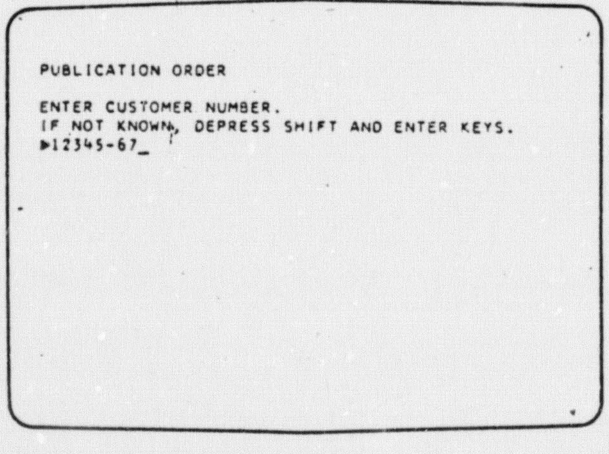
2260 Display Station - Step 2

After the display operator types a response, the display appears as shown in Figure 6-2. The data stream is:

2260 Input

[STX DVC] | 1 2 3 4 5 - 6 7 | [ETX]

Note that the new line character is not used in this example. The required editing is somewhat simplified, since the new line character does not have to be compensated for.


```
PUBLICATION ORDER

ENTER CUSTOMER NUMBER.
IF NOT KNOWN, DEPRESS SHIFT AND ENTER KEYS.
▶12345-67_
```

Figure 6-2. 2260 (Step 2)

3277 Display Station - Step 1

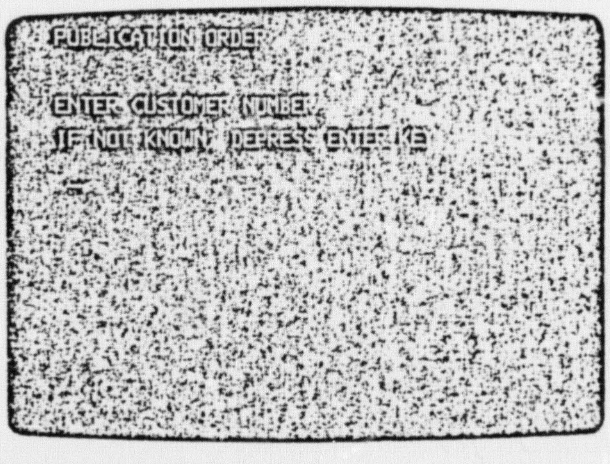
After the 2260 output data stream has been edited for the 3277 display station, and the display is initially written, it appears as shown in Figure 6-3. The data stream for this display format is:

3277 Output (command specified by ESC CMD sequence remote)

[STX ESC CMD] | Control Code | SBA seq | SF seq | TEXT }

{ SF seq | IC | [ETX]

Note both the change in text written to the display station and the deletion of the Start MI symbol which has been replaced by a "blank" character. The required changes have been made by the editing routine in the application program. The operator needs to press only the ENTER key (rather than the SHIFT and ENTER keys).

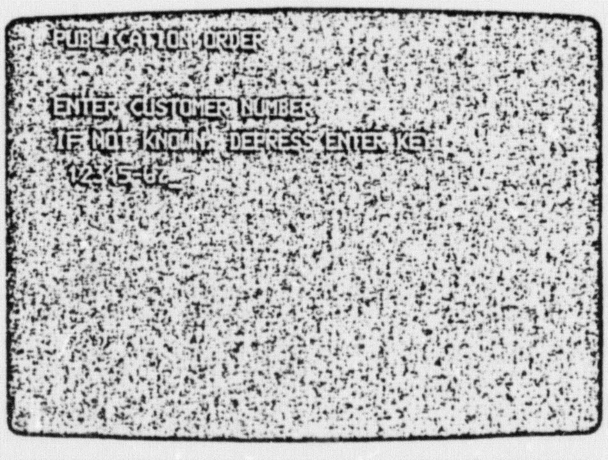

```
PUBLICATION ORDER

ENTER CUSTOMER NUMBER.
IF NOT KNOWN, DEPRESS ENTER KEY
_
```

Figure 6-3. 3277 (Step 1)

3277 Display Station - Step 2

After the display operator types in the data requested, the display appears as shown in Figure 6-4.


```
PUBLICATION ORDER

ENTER CUSTOMER NUMBER.
IF NOT KNOWN, DEPRESS ENTER KEY
 12345-67_
```

Figure 6-4. 3277 (Step 2)

3277 Display Station - Step 3

After the display operator presses the ERASE EOF and ENTER keys, the display appears as shown in Figure 6-5. The data stream is:

3277 Input

[STX CU DVC] | Control Byte | Cursor Position | SBA seq |

| 1 2 3 4 5 - 6 7 | [ETX]

Note that, as compared with the 2260 data streams, additional characters are required in the 3277 data streams preceding and following the text on output and preceding the text on input. Space for the additional characters must be provided by the editing routine in the application program, possibly through expanded input/output work or buffer areas.

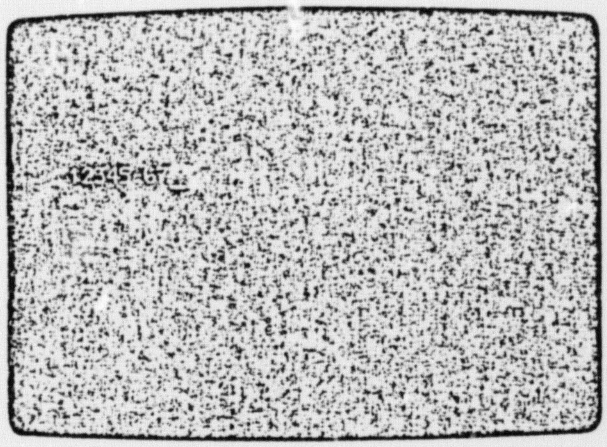


Figure 6-5. 3277 (Step 3)

ESTIMATING THE CONVERSION EFFORT

There is no general "cookbook" for conversion. Every installation has its own special conversion considerations, depending on its particular applications. To gauge the magnitude of a particular conversion effort, these considerations, together with any factors unique to the installation, must be thoroughly understood.

Conversion Segmentation

Typically, key segments of the conversion process can be distinguished, and estimates of the effort involved in each segment can be developed. For example, converting an application program can be segmented as follows:

1. Operating system conversion (if applicable).
2. Access method conversion (if applicable).
3. Minimal modification of application program (to use the 3270 display station in a "2260-like" mode of operation).
4. Maximum modification (redesign and rewrite) of application program (to use additional functional capabilities of the 3270 display system).
5. Reorientation of display operator to new displays and new operations.

Conversion Aids

Planning guides, which can aid in developing estimates, will be available for the first two items listed above. For all items, in addition to documentation, other resources (such as SE services) are available. The list of items is merely intended as a general guideline for assembling the information needed to develop a conversion plan.

CONCLUSION

After the customer has assessed the impact of conversion on his particular applications, a reasonable estimate of the total conversion effort can be assembled. Based on this estimate, the installation can determine the method and schedule for replacing its 2260/2848 display systems with 3270 display systems.

Primary emphasis has been given to the relationship of the equipment to the operator during the development of the IBM 3270 Information Display System. Factors considered include: operator comfort, glare, image legibility, keyboard design, operator efficiency, and operator training costs. This chapter discusses many of these considerations.

DISPLAY IMAGE

All information displayed on the CRT screen must be regenerated periodically for retention of the image. This generation is accomplished automatically by the circuitry in each unit. The speed at which the display image is reproduced is called the "refresh" rate, and, if the displayed image is not refreshed often enough, it can flicker and become difficult to read. The 3270 display system has been designed to refresh the image approximately 50 times per second, creating an easy-to-read display under nominal office conditions.

All characters displayed on the CRT are formed by a pattern of small dots of light on a 7 x 9 dot matrix.

All font designs have been specifically developed for the displays on which they are to appear. Each character has been designed and tested for maximum legibility and minimum ambiguity with similar-appearing symbols. The operator will find the displayed information easily, rapidly, and accurately readable.

Figure 7-1 shows some characters formed with the 7 x 9 dot pattern. A cursor is shown under the E character.

Glare on the face of the CRT from overhead lighting has been minimized by means of the cover design and proper positioning of the CRT. Selecting this approach to control glare in lieu of an anti-glare treatment on the CRT surface prevents degradation of image clarity. Brightness and contrast of the image with the background are other areas of importance. The brightness is operator-adjustable over a range from an unilluminated screen to full character brightness. Added to this, the green CRT phosphor, in conjunction with a neutral density filter which has been incorporated in the CRT, provides excellent character color and contrast within the normal range of room illumination.

KEYBOARDS

The keyboard is connected to the display station by a 2½-foot cable that allows the operator to place the keyboard in the most comfortable and convenient position. Selection of furniture for use with the 3270 should provide a supporting surface for the keyboard that is 26 inches above the floor; this will place the home row keys at the optimum operating height from the floor. A dimension of up to 29 inches may be allowed for lower keying throughput requirements. The angle of surface of the keyboard has been carefully selected to provide maximum comfort and efficiency.

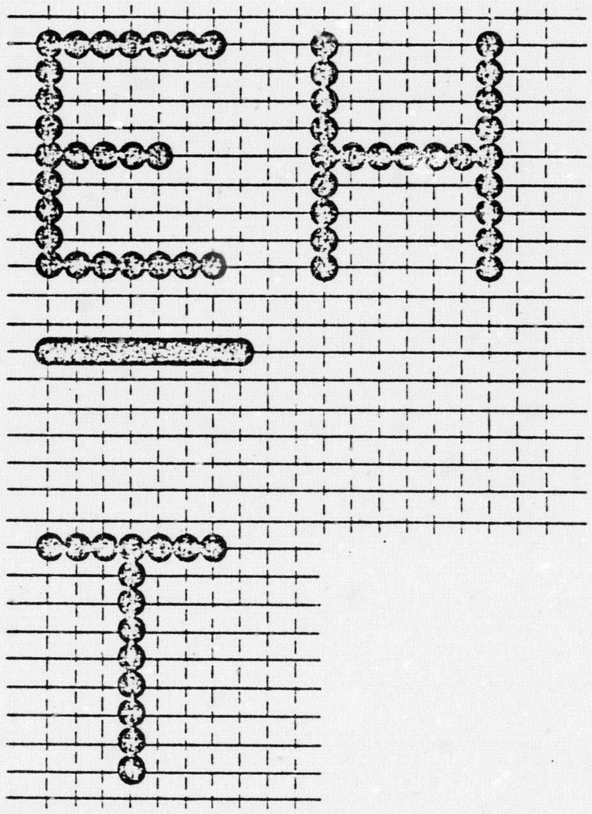


Figure 7-1. Examples of Monocase Characters Formed with 7 [illegible] Dot Pattern

Finger Positioning

So they can be easily found by touch, a deeper than normal depression is provided on those keys that establish the home row position for all keyboards. In the case of the typewriter and operator console keyboards, the two keys selected are those for the index fingers (F and J). On the data entry keyboard, the middle three keys in the numeric row are more deeply dished (4, 5, 6). This ability to identify the proper home row keys improves throughput and reduces error rates.

Keyboard Design

The keyboard design has been developed to provide an uncomplicated keyboard layout. This allows an operator to adapt easily and to feel comfortable during operation of the display station.

The keyboard has been divided into three key groups: data keys, special control keys, and erase keys.

The typewriter keyboards retain the basic key layout found on a common office typewriter. Special function keys, such as ENTER and cursor control keys, have been placed where they can be readily reached from the home row of keys. Little training will be required for an operator who is able to type on a typewriter.

The typewriter keyboard is also used with the Data Analysis - APL Feature. With this feature installed, the full 133-character APL character set is provided, in addition to TN character support.

Data entry keyboards use the same conventional key layout for alphabetic characters that is used on typewriter keyboards. However, the numeric keys and certain function keys are patterned after the IBM 29. The numeric keys are placed in the same configuration that is found on IBM keypunches, allowing one-hand operation.

Data, special cursor control, and function keys are placed so that they may be operated smoothly from the home row position during a single-hand operation. Keypunch operators will have little difficulty in rapidly adapting to this keyboard.

The operator console keyboard layout is similar to the keyboard layout of the IBM 1052 Model 7 presently used with IBM System/360. Here again, the cursor control and special program alert keys have been positioned where they can be used conveniently.

Typamatic Operation

All keyboards in the 3270 system have some typamatic keys, that is, keys that repeat their function as long as they are held down. On the typewriter and operator console keyboards, the Tab, Space, Hyphen/Underscore, New Line, Backspace, and cursor control keys have this function. On the data entry keyboard, the Tab, Space, New Line, SKIP, Backspace, and cursor control keys are typamatic.

Ease of Operation

All keyboards in the 3270 display system operate swiftly, quietly, and have an electrical lock. Data can be inputted from the keyboard at a rate of up to 25 characters per second. Each depression of a key generates an audible reply that signals the operator that the data has been entered into the display station buffer. The lack of an audible reply signifies that the keyboard input is inhibited. In addition, an indication on the display alerts the operator to the fact that the keyboard is electrically locked.

OPERATOR CONTROLS

All 3270 display stations have the combination OFF-PUSH and brightness/contrast control located on the front of the unit. Pulling this control out turns the unit on; pushing in turns it off. When the control is pulled out, the stem of the switch will show red, indicating that the display station is on. Image brightness and dual brightness character contrast can be changed by the operator at any time.

The key lock feature, if installed, is another operator control. This feature provides a key that can be used to control program access to or from a display station (refer to Security Enhancements, Chapter 3); the key receptacle is located on the right side of the unit cover.

INDICATORS

Three indicators are found on all 3277 display stations. These indicators provide the operator with a visual indication of the operational status of the entire display system and particularly that of her own unit. All indicators are located to the right on the CRT screen in a vertical row and are clearly visible. The labels that describe each indicator are located to the right of the CRT screen, parallel with the associated indicator.

3275 display stations have five additional indicators located in line with those described above. 3275 indicators are not located on the CRT screen. Their function is to provide information on the status of the remote communication facilities.

Chapter 8. Installation Planning Data

The physical characteristics and environmental requirements of 3270 units allow a display system installation to be placed in a normal office or computer room environment with a minimum amount of special arrangements. This chapter describes, in general, the reasons why a 3270 display system is easily installed. For more detailed information, contact an IBM installation planning representative or refer to the following publication: *IBM 3270 Information Display System Installation Manual - Physical Planning*, GA27-2787.

PHYSICAL CHARACTERISTICS

The 3270 display system units are attractively packaged, of small size, and of light weight. Control units and printers are similar in appearance and occupy a volume of space equivalent to that of a standard two-drawer office file cabinet. Access to service these units is gained by means of a removable front cover. Service access to display station is gained by means of removable side, top and back, and lower front covers.

Approximate unit weights vary from 120 pounds for a printer, downward to 95 pounds for a control unit, 95 to 65 pounds for various display station models, and 20 pounds for a keyboard.

CABLES

A single coaxial cable connects each 3277 display station and each 3284, 3286, or 3288 printer in the display system to its control unit. This cable is not included with the unit; up to 2000 feet of cabling can be installed. Each device attached to a control unit requires its own cable; therefore, if a control unit has 16 display stations and 8 printers in a configuration, 24 output cables leave this unit. A power control cable and a data signal cable are used in local configurations to communicate between the 3272 control unit and the system channel. These two cables vary in length; depending upon the central processing system configuration, 200 feet is the maximum length of the data signal cable. Remote configurations use only one additional control unit cable, which is the connection to the communication modem.

Display stations, in addition to having a cable for connection to the control unit, have other cables that connect to their attached features; that is, selector pen, card reader, or keyboard. 3275 display stations may also accept one additional cable to attach a 3284 printer, model 3. Table 8-1 lists maximum cable lengths and indicates fixed length cables.

Table 8-1. 3270 Display System Maximum and Fixed Length Cables

From	To	Length (feet)
3271/2 Control Unit	Display station	2000
3271/2 Control Unit	Printer	2000
3272 Control Unit	Channel (power control)[1]	Channel dependent
3272 Control Unit	Channel (data signals)[1]	200
3271 Control Unit or 3275 Display Station	Modem[2,3] or data access arrangement[4]	40
3275/7 Display Station	Keyboard	2½*
3275/7 Display Station	Selector light pen	2*
3275/7 Display Station	Card reader	2½*
3275 Display Station	Printer	10*

* — Fixed length

1 — Local configurations only

2 — Remote configurations only, employing a 3275 display station without the Line Adapter feature installed, or employing a 3271 control unit.

3 — A cable is needed for each of the following feature groups:
- a. 3275, all models, with external modem
- b. 3275, all models, with the Line Adapter

} The 3275 operates via leased lines or with Dial feature installed (BSC mode only) via switched lines.
- c. 3275, model 1 or 2, using Dial and Line Adapter with Auto Answer feature.

4 — A data access arrangement is required when using the Line Adapter to connect a 3275, model 1 or 2, that is equipped with the Dial feature, to a switched telephone network.

Customers who presently use an IBM 2260/2848 display system can convert to a 3270 display system without replacing the 2848-to-2260 coaxial signal cable. The cables used in the installed display system can easily be adapted for use on the 3270 display system.

Chapter 9. Reliability, Serviceability, and Availability

With the growth of online data processing, the availability of a central processing system and attached devices becomes an essential factor in computer operations. The 3270 display system has been provided with many facilities to achieve a high degree of reliability, serviceability, and availability.

Decentralized packaging of critical hardware components highlights the engineering features that make the 3270 more reliable and easier to service. Earlier display systems were designed with central storage buffer and central controls packaged in the control unit. In the 3270 display system, each unit is provided with a separate buffer character generator and separate keyboard controls that are packaged in the device. Thus, the number of components in the control unit is significantly reduced, resulting in a substantial improvement in subsystem reliability. Further, decentralization results in a lower-cost control unit; this permits a customer with a critical application to configure a display system with two control units at a minimal cost increase. With two control units included in a configuration, failure of a critical component in one unit disables only a portion of the display system.

Serviceability improvements include:

- Built-in recovery and retry circuits.
- A maintenance approach based on online and offline test procedures.
- IBM FE Teleprocessing Test Center support for the IBM customer engineer, when the CE services remote display systems that use BSC line discipline.

Unit reliability is improved through the use of a more reliable and more densely packed circuit technology. This improvement reduces the frequency of service calls. Additionally, 3270 control units have the capability to retry any data transfer to a device which fails. The application program is not alerted to a failure unless the retry also fails. Parity check circuits are incorporated at many points within the control units and devices.

Access method programming error-recovery procedures provide additional improvements important to the system operation to supplement the hardware provisions.

Service is also made easier by the interchangeability of similar 3270 units. This factor is particularly useful when a keyboard or selector pen problem is being investigated.

The general maintenance approach begins with providing the customer as much information as possible so that he can determine the operational status of the equipment before calling the customer engineer (CE). When the CE arrives, the customer's description of the problem will aid in directing fault-isolation activities. In some cases the customer's awareness will allow rapid system restoration by directing the CE to the geographic location where the failure exists. The CE will replace failing sections of a unit, called field-replaceable units (FRU), rather than repairing them.

Online maintenance capability is stressed as the starting point of all 3270 maintenance activity. Customers are encouraged to learn the operational status of the equipment. When using BSC line discipline, online tests available for customer use are the request-for-test (RFT) facilities. RFT capability under the Basic Telecommunications Access Method (BTAM) programming support allows a limited number of test messages to be requested and run concurrently with the customer's application program. These messages generate predetermined patterns for 3270 display stations and printers. The tests are performed from a display station according to a procedure initiated by the device operator; this procedure requires depressing the TEST REQ key. Under the Telecommunications Access Method (TCAM), the requested test pattern may be sent to the display station that originated the request, to a different display station, or to a buffered printer.

Units may be reassigned to different partitions to aid problem-determination and fault-isolation. This capability is applicable to local display systems employing BTAM under the System/360 Disk Operating System (DOS) or the System/360 Operating System (OS); or it may apply to a system using TCAM under OS. The access method and operating systems allow the failing unit to be removed from the applicable partition for corrective maintenance.

The customer can initiate an offline printer test which will exercise the mechanical parts of the printer and approximately 80 to 85 percent of the electronic logic (to demonstrate operational status).

RFT online tests are useful problem-determination tools because they provide considerable information about system operation. For example, the successful reception of an online test is valuable as follows:

1. It verifies that the operating system and the BTAM program are executing in the computer.
2. It verifies continuity of the data transmission path from the requesting device to the computer and from the computer to the device being tested.

To aid customers and operating personnel in reporting equipment problems, in running RFTs, and in gaining an overall operational knowledge of the 3270, the following publications are made available: The *IBM 3270 Information Display System Problem Determination Guide*, GA27-2750, and the *Operator's Guide for IBM 3270 Information Display Systems*, GA27-2742. The Operator's Guide describes manual operation of the 3270 system display station, the operator identification card reader, the selector pen, and the printer. The functions of all keys and controls are explained. When a trouble is first noted, the operator should follow instructions given in the Operator's Guide to determine whether the problem was caused by incorrect operating procedure or by an equipment failure. The operator is instructed to check that the power cord is plugged into the power receptacle and then repeat and verify the operating procedure used when the failure occurred. The Problem Determination Guide is an aid for reporting trouble symptoms accurately and completely. Specific trouble-isolating procedures are given. The guide also contains procedures for initiating RFT's from a display station and instructions for reporting unit configuration data (information which tells the CE the relationship of a unit to other system units).

If the customer at a remote terminal is not certain that a failure has occurred at the terminal location, he should contact the CE at the CPU location to determine whether a CE should be sent to service the terminal.

The CE's efforts to locate and repair a failing unit are usually based on the customer's description of the trouble. Both online and offline test procedures are available to the CE, as described in the FE Troubleshooting manuals. In general, the CE begins by trying to simulate the customer's failing program, using manual offline test procedures.

In local configurations, the CE may decide to run RFTs to confirm customer-reported symptoms, or he may run online test (OLT)* diagnostic programs at the main computer site. There are five OLT categories: functional checks, which isolate failures to units within a system; keyboard checks, which test keyboards attached to a display station; operator identification card reader checks, to verify card reader operation; test patterns, to check for correct display station operation; and card calling routines, which specify failing circuit cards within a control unit.

In remote configurations, simulated operation is made possible at the 3271 control unit and at the 3275 display station by using test equipment which functions without the main computer and the common carrier network. When using the BSC operating mode, IBM CEs in the United States and Canada are futher supported by Test Specialists and test programs at the IBM FE Teleprocessing Test Center (TPTC). This support is provided to further minimize service time for remote 3270 display system problems. By connecting the remote system to the TPTC via common carrier lines and a modem, the CE has access to the diagnostic programs without using the customer's CPU. These programs are the regular 3270 remote OLTs that can be executed from the TPTC.

IBM CEs in World Trade Corporation (WTC) countries can also simulate remote 3271 control unit and 3275 display station operations at the control unit or display station by using test equipment which functions without a CPU and common carrier network. Many WTC countries have Test Specialists on call at central locations available to aid CEs in troubleshooting remote configurations.

---

*The OLT program resides in the library of the customer's operating system.

Chapter 10. Performance Considerations

Evaluation of the performance of a 3270 display system is affected by several factors that significantly influence the results. The principal influence is the type of configuration. A display system configured for local (direct) attachment to a system channel will generally provide a response time of 1 second or less for typical transactions. The larger part of this 1-second response period is utilized for processing and file operations within the central processor. A display system configured for remote attachment (by means of communication facilities) to a system channel will generally require more than 1 second to respond to operator inquiries. The added time for a remote operation is caused by the data transmission rates of the communication facilities and is significantly influenced by the number of display stations attached to the same communication line.

Other factors that influence performance are largely dependent upon the application, for example, typical message length, message format, system channel loading, and transaction interaction time.

Because of the many possible display system configurations and the wide variety of applications, it is not practical to provide simple timing formulas, graphs, or performance data that expresses, in exact terms, the system performance capabilities. The data presented in this chapter represents reasonable approximations of 3270 display system performance for a few general applications; and it should be understood that many factors could cause variations in the results.

BASIC CONFIGURATION DIFFERENCES

The reason for a difference in operator response times between a locally attached and a remotely attached display system becomes apparent when the total information transfer path of each configuration is considered (Figure 10-1). Depending upon the line speed, 1200, 2400, 4800, or 7200 bps, the 150, 300, 600, or 900 character-per-second data-transfer rate, respectively, is the fundamental factor limiting response time and the number of display stations that can be supported on a single communication line.

Plotting local and remote response times with various numbers of displays in the display system produces a relationship such as that shown in Figure 10-2. The transactions evaluated in Figure 10-2 consist of a 40-character input message and an 800-character output message from the program. The average time between transactions (interval between enter operations) for this case is 30 seconds.

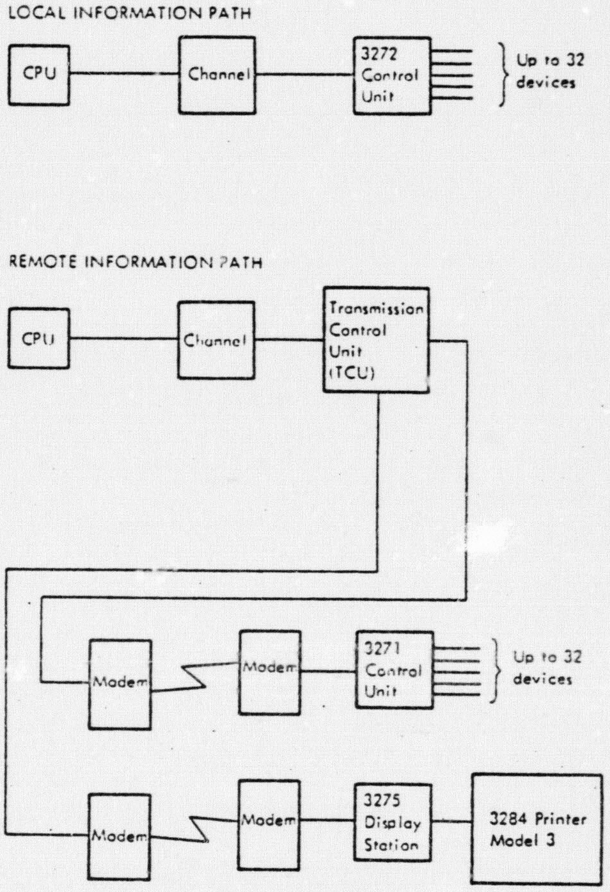


Figure 10-1. Information Path Comparison

DISPLAY SYSTEMS ATTACHED LOCALLY

Locally attached display systems service operator inquiries fast enough to virtually eliminate operator idle-time between the transmission and reception of messages. A local display system that is attached to a heavily loaded system channel may experience response times greater than 1 second because of heavy channel activity. To help rectify this situation, the display system is provided with the ability to prepare for an anticipated system channel instruction without being operationally connected to the system channel. The Select command (Chapter 3) initiates a device to control unit buffer transfer operation that requires up to 70 ms. Upon completion of the buffer load

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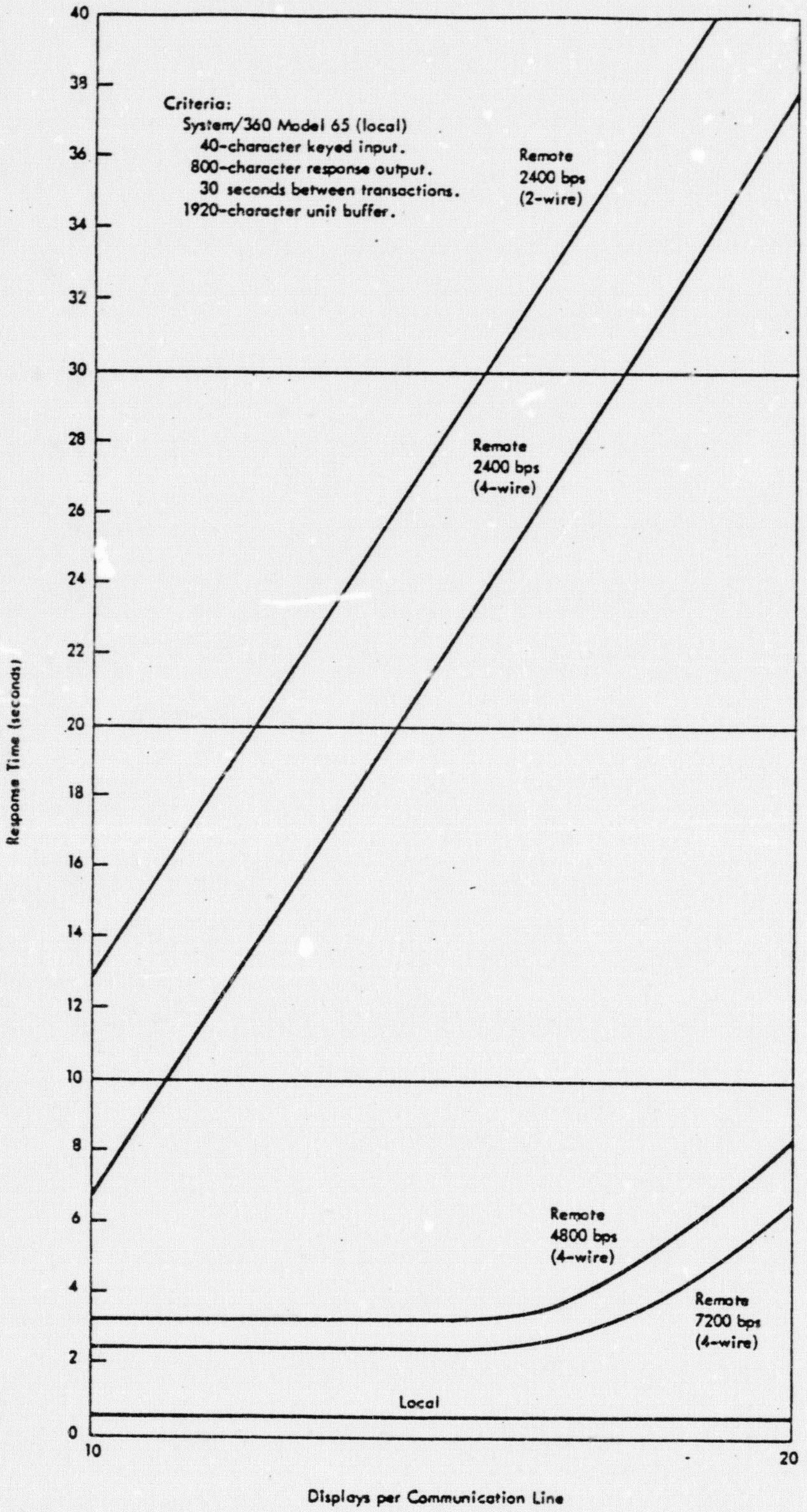


Figure 10-2. Comparison of Local and Remote Response Times

operation, the subsequent program operation is executed with data transfer rates of 14,000 to 650,000 characters per second, depending upon channel characteristics. The select operation is most advantageous when used with a block multiplexer channel.

DISPLAY SYSTEMS ATTACHED REMOTELY

The design of remote display systems must satisfy three important factors: (1) operator idle-time while waiting for a system response, (2) the workload (messages per unit time) to be processed, and (3) the cost of the communication facilities. Proper use of the built-in functional control capabilities of the 3270 display system can lead to a significant reduction in the amount of information transmitted per transaction and, consequently, can decrease the transmission load of the communication facility. While also reducing the time an operator waits for a system response, the decrease in utilization allows more displays to share a communications line and may lower the total cost of the required communications network.

The importance of careful remote display system planning to incorporate the advantages offered in the 3270 display system cannot be overemphasized. Significant reductions in communications line cost can be realized if the advantages of data compaction are fully employed. Contact your IBM representative for additional information.

A wide variety of representative applications have been analyzed with the Systems Performance and Design Evaluation Simulator. Directed at performance estimation on a total system basis, this simulator accounts for all hardware characteristics of the 3270, the operational sequences of the BSC line control discipline, modem request-to-send/clear-to-send delays, characteristics of the TCAM access method, and all pertinent application program timings associated with operator-initiated transactions. Charts A through E present average operator wait times (response times) as a function of the number of displays (often in cluster sizes) sharing a single line. The modem characteristics are based upon the IBM 3872, the IBM 4872, and the IBM 3875 Modems for the 2400-bps, 4800-bps, and 7200-bps networks respectively. All other criteria are outlined on each chart.

The time between transactions represents the time required for an operator to prepare a message (think time plus key-in time) following receipt of the previous response from the system. Average response time is defined as the elapsed time between depression of an ENTER key and the appearance of the first character of the system response on the display screen.

Charts A through E are provided for general information and should be interpreted only within the context of their underlying assumptions. It should also be recognized that many points on the curves represent excessively high system response times because of an unreasonable load on the communications line. In reality, such a system would not be configured; the results are presented only for completeness.

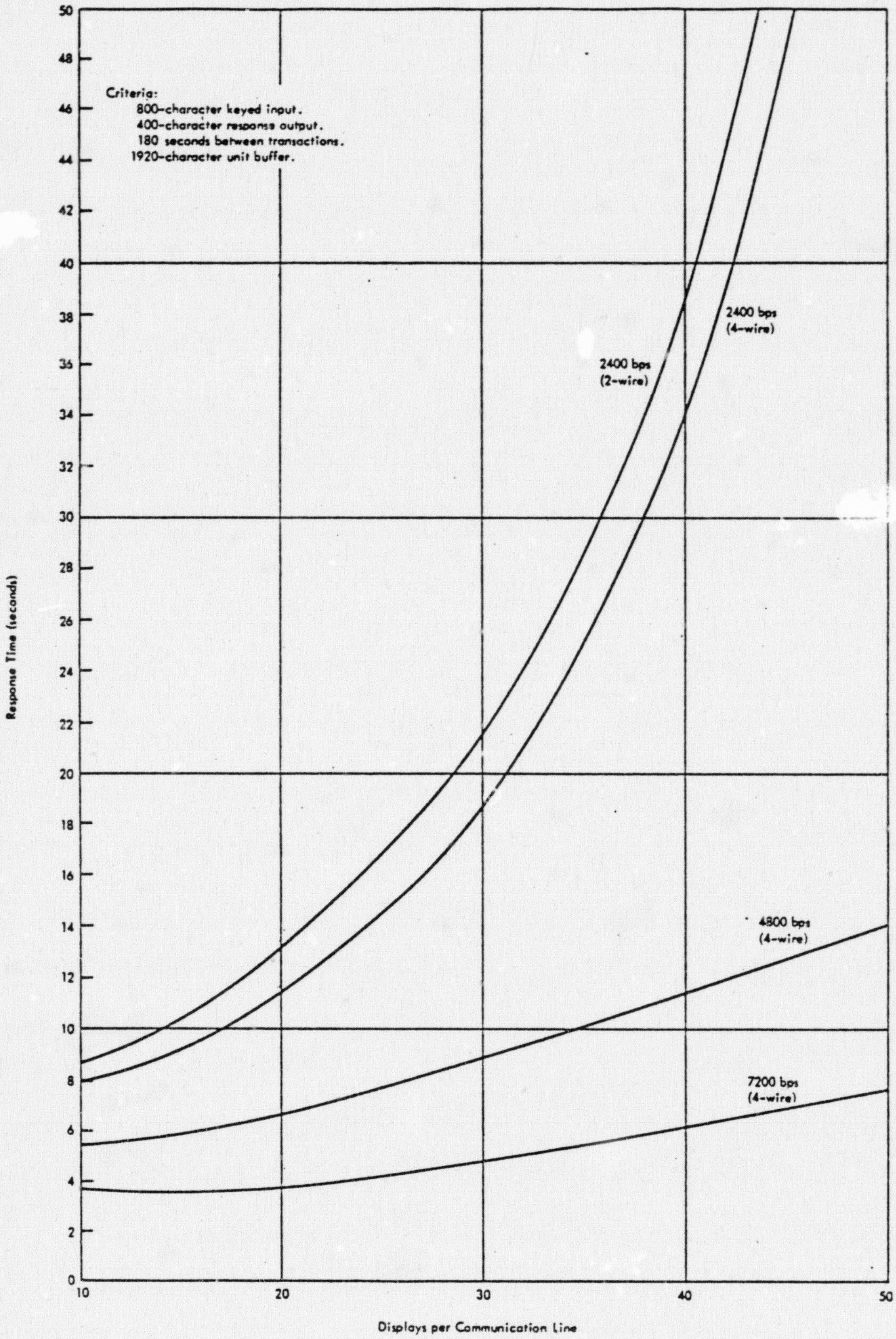

Criteria:
800-character keyed input.
400-character response output.
180 seconds between transactions.
1920-character unit buffer.
Response Time (seconds)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
10
20
30
40
50
Displays per Communication Line
2400 bps (2-wire)
2400 bps (4-wire)
4800 bps (4-wire)
7200 bps (4-wire)

CHART A

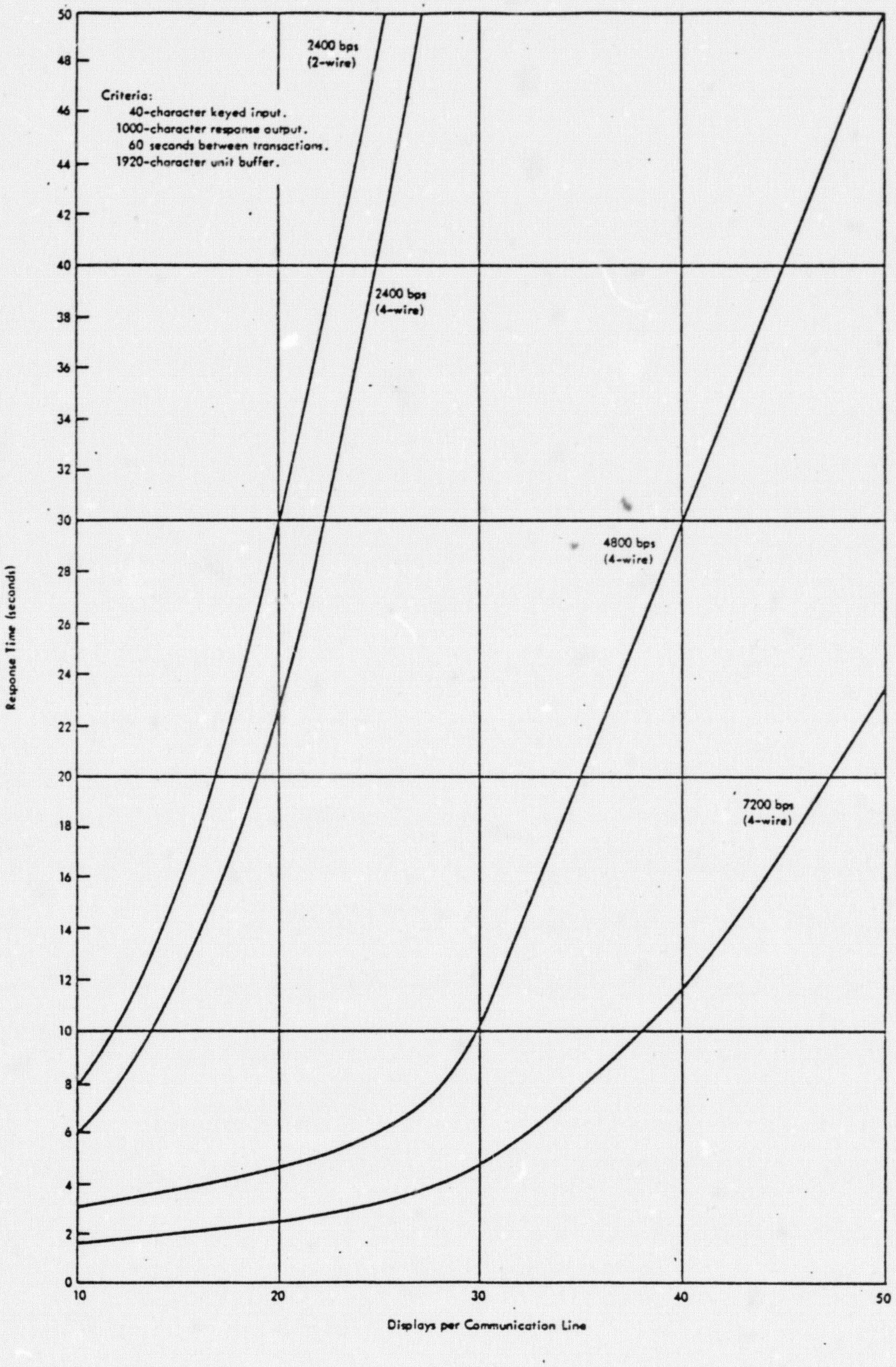
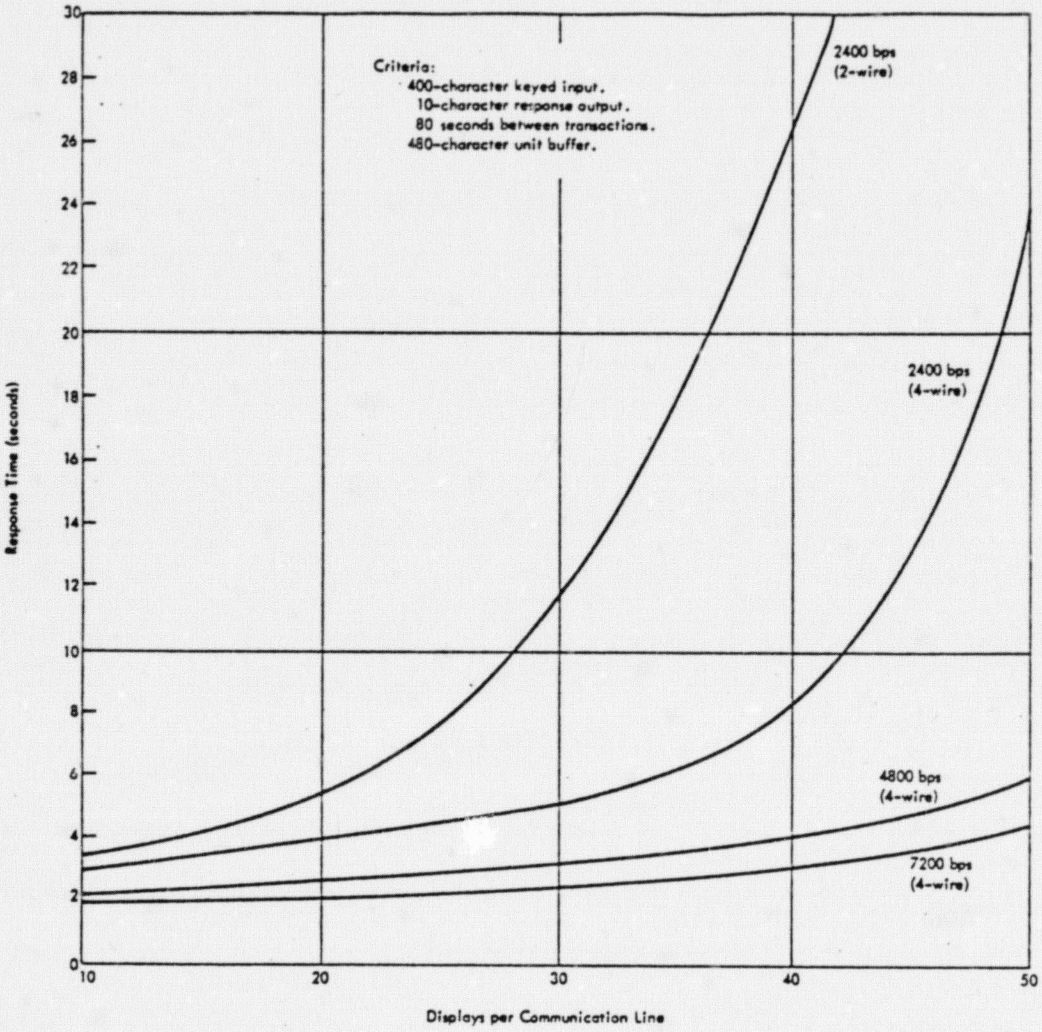

Criteria:
40-character keyed input.
1000-character response output.
60 seconds between transactions.
1920-character unit buffer.
2400 bps (2-wire)
2400 bps (4-wire)
4800 bps (4-wire)
7200 bps (4-wire)
Response Time (seconds)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
Displays per Communication Line
10
20
30
40
50

CHART B



Criteria:
400-character keyed input.
10-character response output.
80 seconds between transactions.
480-character unit buffer.

CHART C

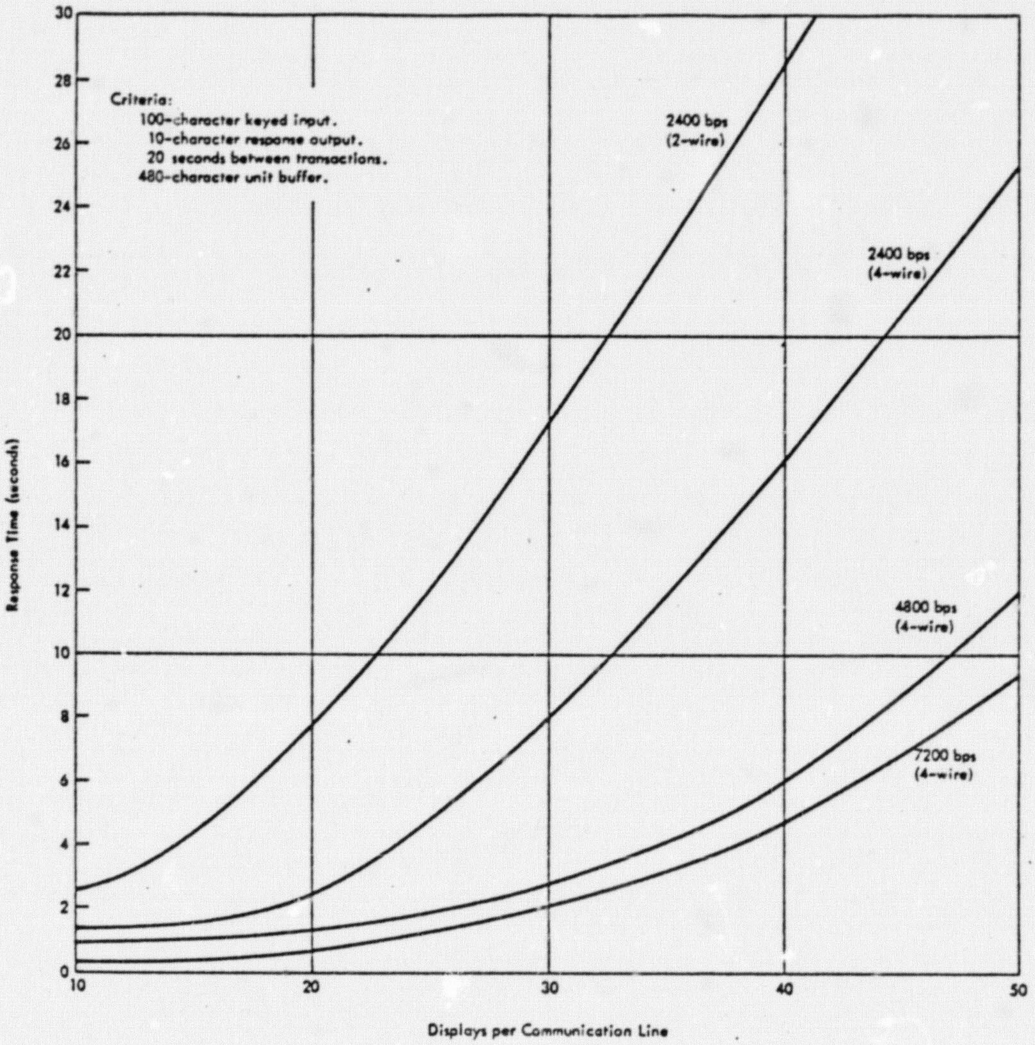

Criteria:
100-character keyed input.
10-character response output.
20 seconds between transactions.
480-character unit buffer.
2400 bps (2-wire)
2400 bps (4-wire)
4800 bps (4-wire)
7200 bps (4-wire)
Response Time (seconds)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
10
20
30
40
50
Displays per Communication Line

CHART D

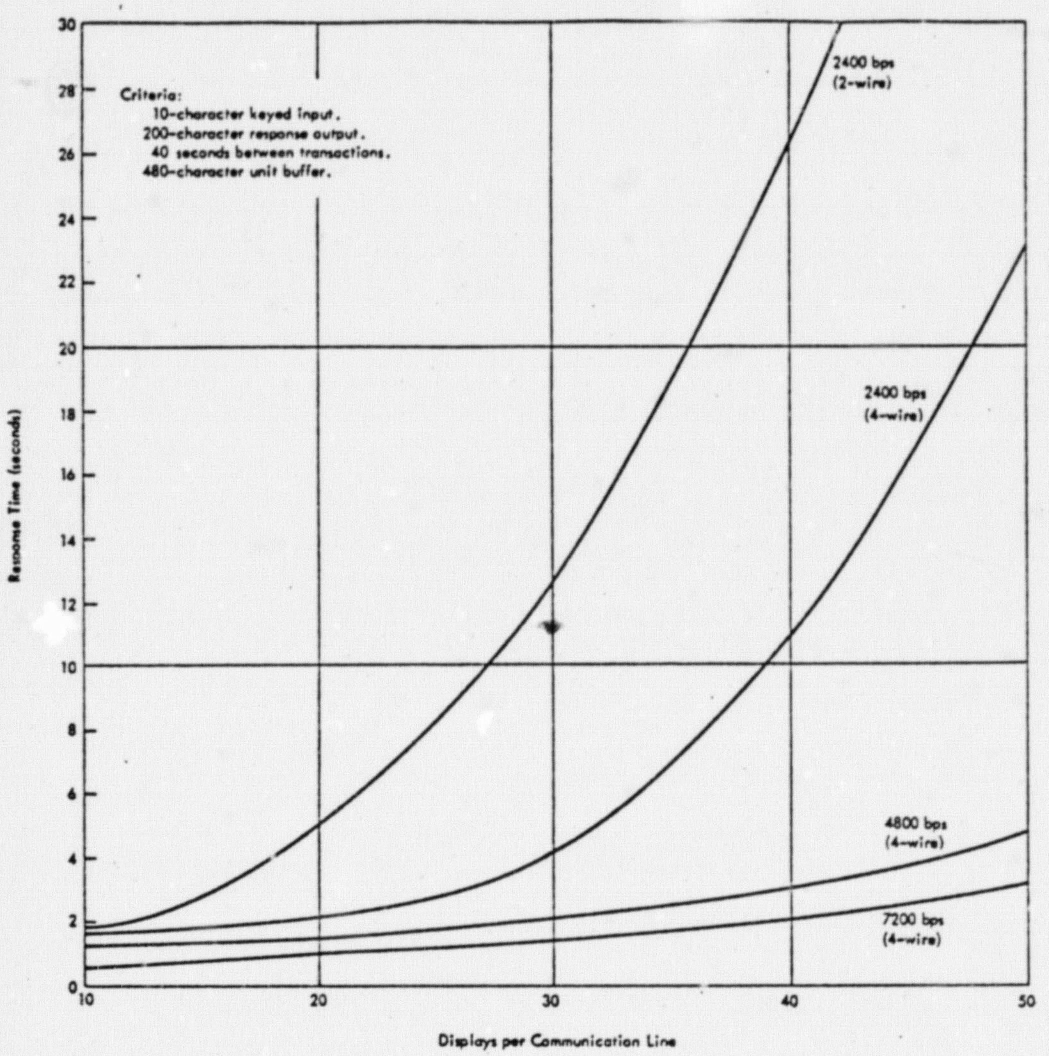

Criteria:
10-character keyed input.
200-character response output.
40 seconds between transactions.
480-character unit buffer.
2400 bps (2-wire)
2400 bps (4-wire)
4800 bps (4-wire)
7200 bps (4-wire)
Response Time (seconds)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
10
20
30
40
50
Displays per Communication Line

CHART E

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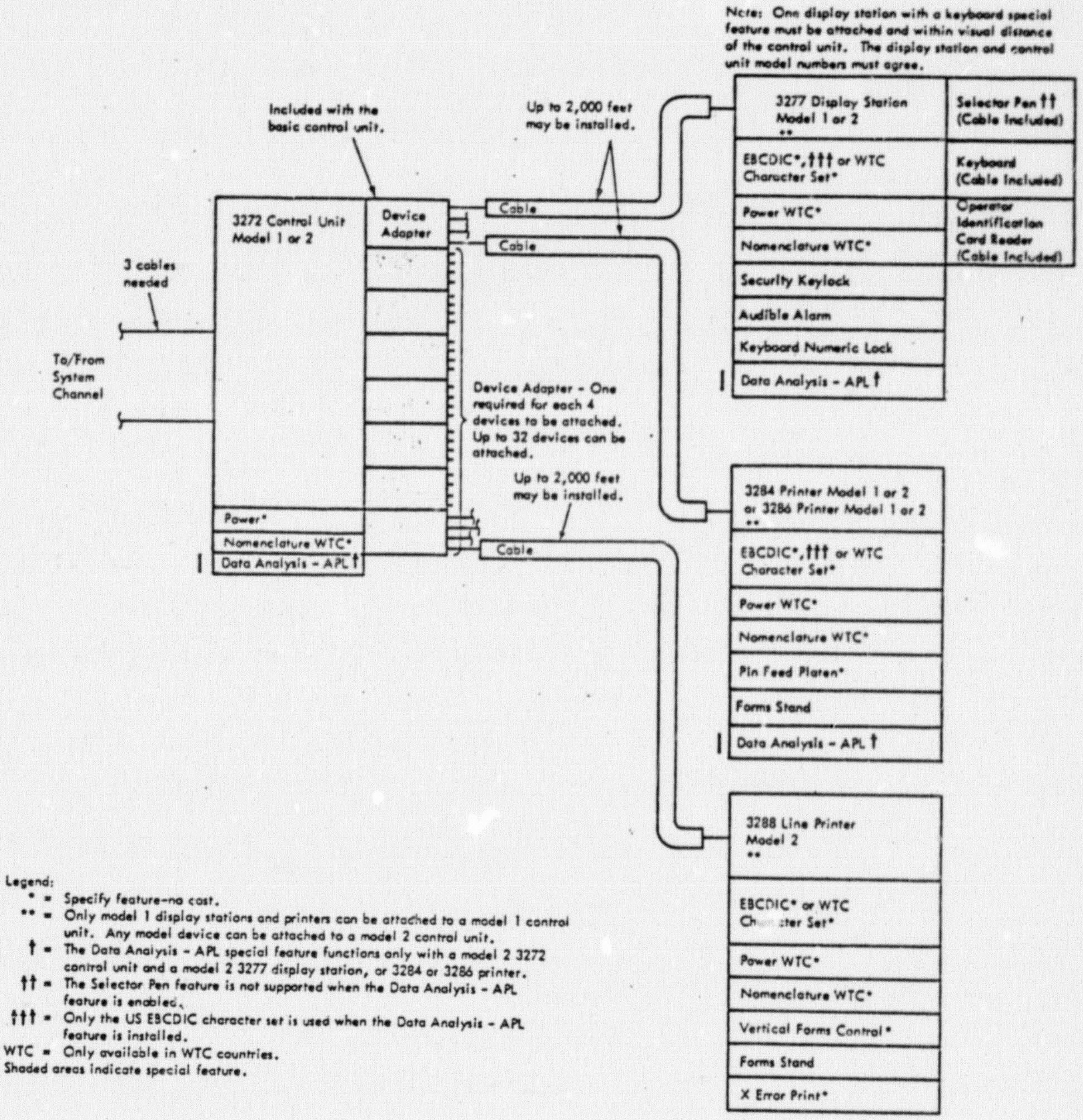
Appendix A. Configurator

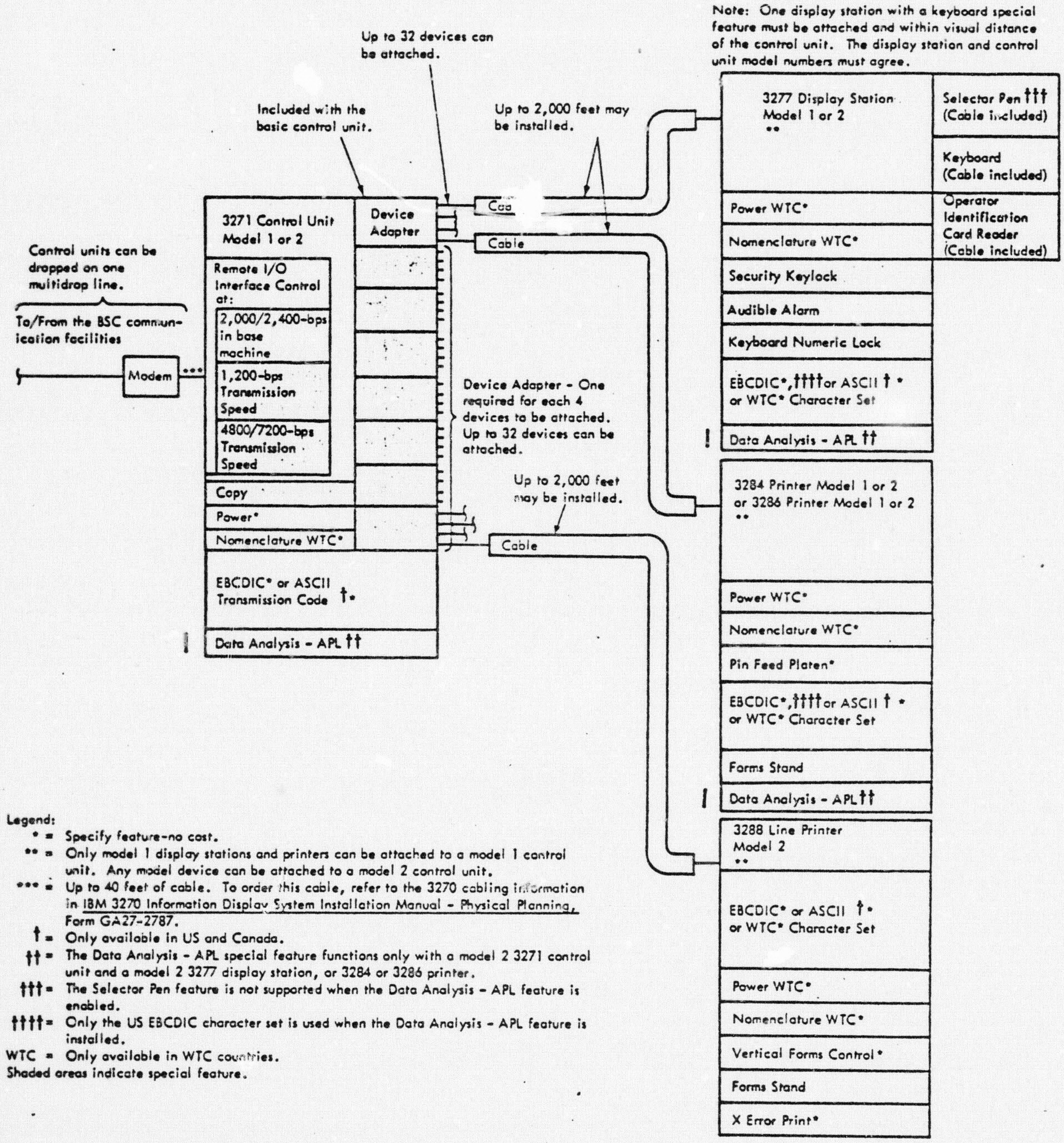


Included with the basic control unit.
Up to 2,000 feet may be installed.
3272 Control Unit Model 1 or 2
Device Adapter
Cable
Cable
3 cables needed
To/From System Channel
Power*
Nomenclature WTC*
Data Analysis - APL †
Device Adapter - One required for each 4 devices to be attached. Up to 32 devices can be attached.
Up to 2,000 feet may be installed.
Cable
3277 Display Station Model 1 or 2 **
EBCDIC*, ††† or WTC Character Set*
Power WTC*
Nomenclature WTC*
Security Keylock
Audible Alarm
Keyboard Numeric Lock
Data Analysis - APL †
Selector Pen ††(Cable Included)
Keyboard (Cable Included)
Operator Identification Card Reader (Cable Included)
3284 Printer Model 1 or 2 or 3286 Printer Model 1 or 2 **
EBCDIC*, ††† or WTC Character Set*
Power WTC*
Nomenclature WTC*
Pin Feed Platen*
Forms Stand
Data Analysis - APL †
3288 Line Printer Model 2 **
EBCDIC* or WTC Character Set*
Power WTC*
Nomenclature WTC*
Vertical Forms Control*
Forms Stand
X Error Print*

Note: One display station with a keyboard special feature must be attached and within visual distance of the control unit. The display station and control unit model numbers must agree.

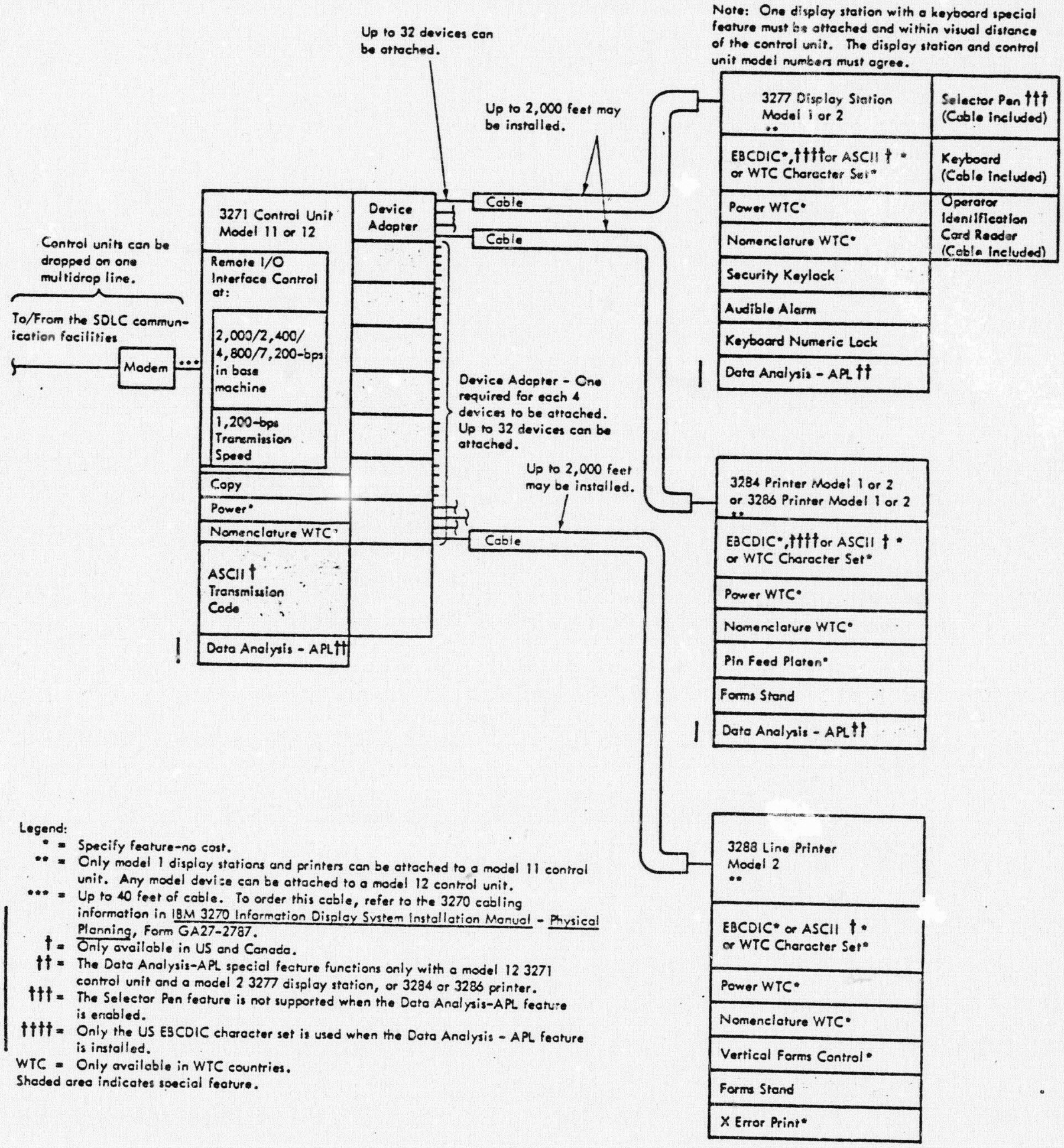
Legend:
* = Specify feature–no cost.
** = Only model 1 display stations and printers can be attached to a model 1 control unit. Any model device can be attached to a model 2 control unit.
† = The Data Analysis - APL special feature functions only with a model 2 3272 control unit and a model 2 3277 display station, or 3284 or 3286 printer.
†† = The Selector Pen feature is not supported when the Data Analysis - APL feature is enabled.
††† = Only the US EBCDIC character set is used when the Data Analysis - APL feature is installed.
WTC = Only available in WTC countries.
Shaded areas indicate special feature.

Figure A-1. 3270 Display System - Local


Note: One display station with a keyboard special feature must be attached and within visual distance of the control unit. The display station and control unit model numbers must agree.
Up to 32 devices can be attached.
Included with the basic control unit.
Up to 2,000 feet may be installed.
Control units can be dropped on one multidrop line.
To/From the BSC communication facilities
Modem
***
3271 Control Unit Model 1 or 2
Device Adapter
Remote I/O Interface Control at:
2,000/2,400-bps in base machine
1,200-bps Transmission Speed
4800/7200-bps Transmission Speed
Copy
Power*
Nomenclature WTC*
EBCDIC* or ASCII Transmission Code †*
Data Analysis - APL ††
Device Adapter - One required for each 4 devices to be attached. Up to 32 devices can be attached.
Cable
Cable
Up to 2,000 feet may be installed.
Cable
3277 Display Station Model 1 or 2 **
Selector Pen ††† (Cable included)
Keyboard (Cable included)
Operator Identification Card Reader (Cable included)
Power WTC*
Nomenclature WTC*
Security Keylock
Audible Alarm
Keyboard Numeric Lock
EBCDIC*,†††† or ASCII † * or WTC* Character Set
Data Analysis - APL ††
3284 Printer Model 1 or 2 or 3286 Printer Model 1 or 2 **
Power WTC*
Nomenclature WTC*
Pin Feed Platen*
EBCDIC*,†††† or ASCII † * or WTC* Character Set
Forms Stand
Data Analysis - APL ††
3288 Line Printer Model 2 **
EBCDIC* or ASCII †* or WTC* Character Set
Power WTC*
Nomenclature WTC*
Vertical Forms Control*
Forms Stand
X Error Print*

Legend:
* = Specify feature-no cost.
** = Only model 1 display stations and printers can be attached to a model 1 control unit. Any model device can be attached to a model 2 control unit.
*** = Up to 40 feet of cable. To order this cable, refer to the 3270 cabling information in IBM 3270 Information Display System Installation Manual - Physical Planning, Form GA27-2787.
† = Only available in US and Canada.
†† = The Data Analysis - APL special feature functions only with a model 2 3271 control unit and a model 2 3277 display station, or 3284 or 3286 printer.
††† = The Selector Pen feature is not supported when the Data Analysis - APL feature is enabled.
†††† = Only the US EBCDIC character set is used when the Data Analysis - APL feature is installed.
WTC = Only available in WTC countries.
Shaded areas indicate special feature.

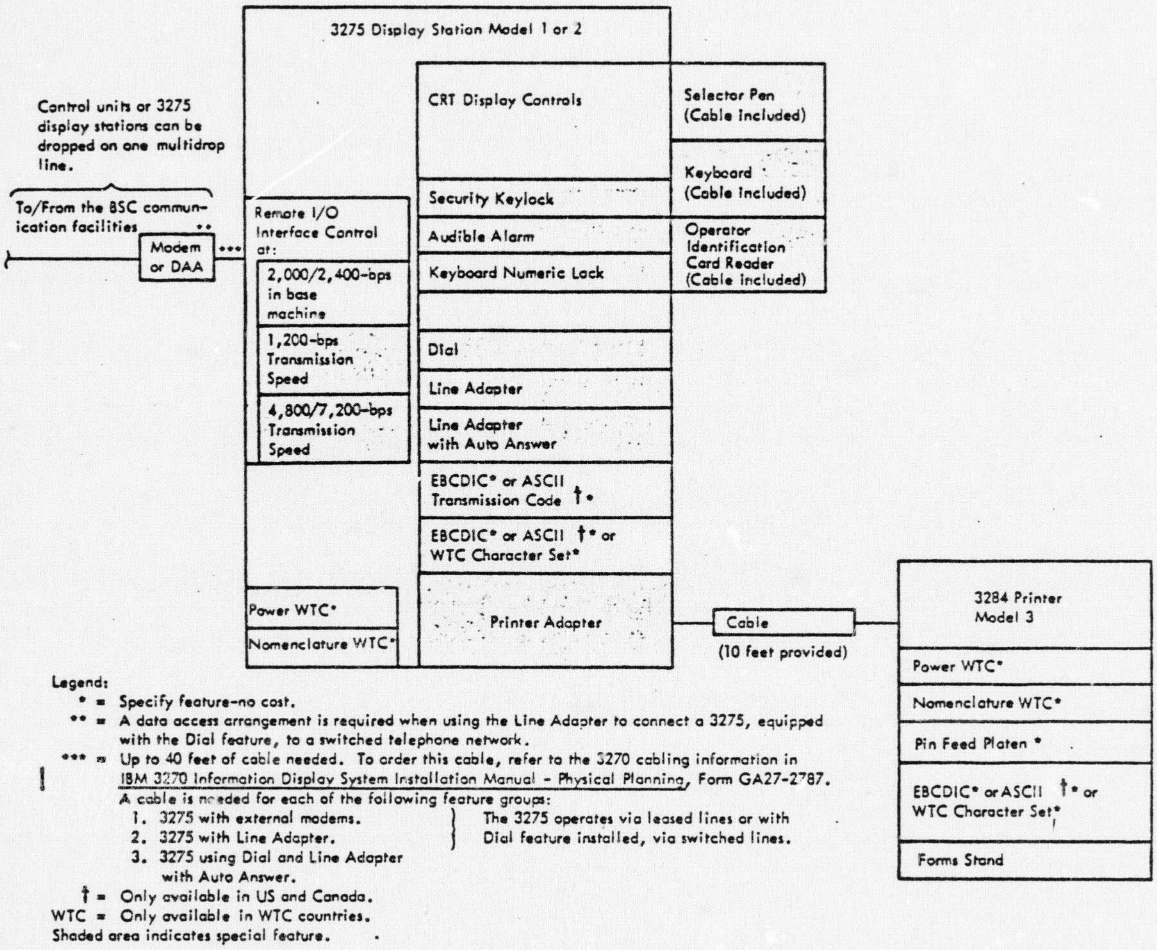
Figure A-2. Remote 3270 Display System Employing a 3271 Control Unit, Model 1 or 2 (BSC Application)


3271 Control Unit Model 11 or 12
Remote I/O Interface Control at:
2,000/2,400/4,800/7,200-bps in base machine
1,200-bps Transmission Speed
Copy
Power*
Nomenclature WTC*
ASCII † Transmission Code
Data Analysis - APL ††
Device Adapter
Modem
Cable
Cable
Cable
Control units can be dropped on one multidrop line.
To/From the SDLC communication facilities
Up to 32 devices can be attached.
Up to 2,000 feet may be installed.
Device Adapter - One required for each 4 devices to be attached. Up to 32 devices can be attached.
Up to 2,000 feet may be installed.
3277 Display Station Model 1 or 2 **
EBCDIC*,†††† or ASCII † * or WTC Character Set*
Power WTC*
Nomenclature WTC*
Security Keylock
Audible Alarm
Keyboard Numeric Lock
Data Analysis - APL ††
Selector Pen ††† (Cable Included)
Keyboard (Cable Included)
Operator Identification Card Reader (Cable Included)
3284 Printer Model 1 or 2 or 3286 Printer Model 1 or 2 **
EBCDIC*,†††† or ASCII † * or WTC Character Set*
Power WTC*
Nomenclature WTC*
Pin Feed Platen*
Forms Stand
Data Analysis - APL ††
3288 Line Printer Model 2 **
EBCDIC* or ASCII † * or WTC Character Set*
Power WTC*
Nomenclature WTC*
Vertical Forms Control*
Forms Stand
X Error Print*

Note: One display station with a keyboard special feature must be attached and within visual distance of the control unit. The display station and control unit model numbers must agree.

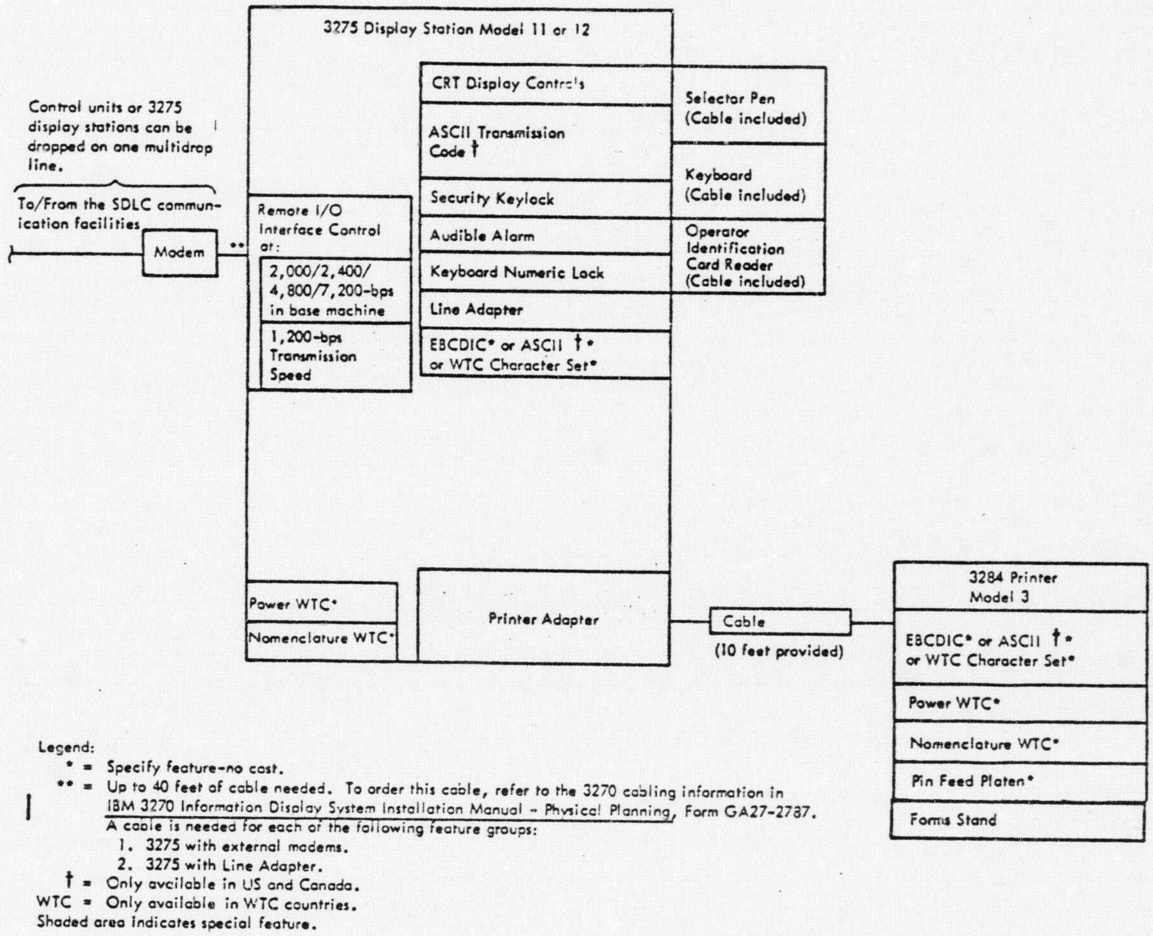
Legend:
* = Specify feature-no cost.
** = Only model 1 display stations and printers can be attached to a model 11 control unit. Any model device can be attached to a model 12 control unit.
*** = Up to 40 feet of cable. To order this cable, refer to the 3270 cabling information in IBM 3270 Information Display System Installation Manual - Physical Planning, Form GA27-2787.
† = Only available in US and Canada.
†† = The Data Analysis-APL special feature functions only with a model 12 3271 control unit and a model 2 3277 display station, or 3284 or 3286 printer.
††† = The Selector Pen feature is not supported when the Data Analysis-APL feature is enabled.
†††† = Only the US EBCDIC character set is used when the Data Analysis - APL feature is installed.
WTC = Only available in WTC countries.
Shaded area indicates special feature.

Figure A-3. Remote 3270 Display Station Employing a 3271 Control Unit, Model 11 or 12 (SDLC Application)


3275 Display Station Model 1 or 2
Control units or 3275 display stations can be dropped on one multidrop line.
To/From the BSC communication facilities
**
Modem or DAA
***
Remote I/O Interface Control at:
2,000/2,400-bps in base machine
1,200-bps Transmission Speed
4,800/7,200-bps Transmission Speed
CRT Display Controls
Security Keylock
Audible Alarm
Keyboard Numeric Lock
Dial
Line Adapter
Line Adapter with Auto Answer
EBCDIC* or ASCII Transmission Code †*
EBCDIC* or ASCII †* or WTC Character Set*
Power WTC*
Nomenclature WTC*
Printer Adapter
Selector Pen (Cable included)
Keyboard (Cable included)
Operator Identification Card Reader (Cable included)
Cable
(10 feet provided)
3284 Printer Model 3
Power WTC*
Nomenclature WTC*
Pin Feed Platen *
EBCDIC* or ASCII †* or WTC Character Set*
Forms Stand

Legend:
* = Specify feature–no cost.
** = A data access arrangement is required when using the Line Adapter to connect a 3275, equipped with the Dial feature, to a switched telephone network.
*** = Up to 40 feet of cable needed. To order this cable, refer to the 3270 cabling information in IBM 3270 Information Display System Installation Manual – Physical Planning, Form GA27-2787.
A cable is needed for each of the following feature groups:
1. 3275 with external modems.
2. 3275 with Line Adapter.
3. 3275 using Dial and Line Adapter with Auto Answer.
} The 3275 operates via leased lines or with Dial feature installed, via switched lines.
† = Only available in US and Canada.
WTC = Only available in WTC countries.
Shaded area indicates special feature.

Figure A-4. 3275 Display Station, Model 1 or 2 (BSC Application)


3275 Display Station Model 11 or 12
Control units or 3275 display stations can be dropped on one multidrop line.
To/From the SDLC communication facilities
Modem
**
Remote I/O Interface Control at:
2,000/2,400/4,800/7,200-bps in base machine
1,200-bps Transmission Speed
CRT Display Controls
ASCII Transmission Code †
Security Keylock
Audible Alarm
Keyboard Numeric Lock
Line Adapter
EBCDIC* or ASCII †* or WTC Character Set*
Selector Pen (Cable included)
Keyboard (Cable included)
Operator Identification Card Reader (Cable included)
Power WTC*
Nomenclature WTC*
Printer Adapter
Cable
(10 feet provided)
3284 Printer Model 3
EBCDIC* or ASCII †* or WTC Character Set*
Power WTC*
Nomenclature WTC*
Pin Feed Platen*
Forms Stand

Legend:

* = Specify feature-no cost.

** = Up to 40 feet of cable needed. To order this cable, refer to the 3270 cabling information in IBM 3270 Information Display System Installation Manual – Physical Planning, Form GA27-2787. A cable is needed for each of the following feature groups:

1. 3275 with external modems.
2. 3275 with Line Adapter.

† = Only available in US and Canada.

WTC = Only available in WTC countries.

Shaded area indicates special feature.

Figure A-5. 3275 Display Station, Model 11 or 12 (SDLC application)

Appendix B. Features List and World Trade Keyboards

Table B-1. Features List

Feature Name	Control Units		Display Stations		Printers		
	3272	3271	3275	3277	3284	3286	3288
US Power 115V ± 10% - 60 Hz	S	S	S	S	S	S	S
US Power 208V ± 10% - 60 Hz	S	S					
US Power 230V ± 10% - 60 Hz	S	S					
Pin Feed Platen, 120 Print Positions*					S	S	
Pin Feed Platen, 126 Print Positions*					S	S	
Pin Feed Platen, 132 Print Positions*					S	S	
ASCII Transmission Code		S†	S†				
ASCII Transmission Code		O***	O***				
ASCII Character Generator - Character Set A			S††	S††	S	S	S
ASCII Character Generator - Character Set B			S††	S††	S	S	S
64-Character EBCDIC Domestic (US) Character Belt*							S
64-Character EBCDIC French (US) Character Belt**							S
64-Character EBCDIC United Kingdom Character Belt**							S
61-Character EBCDIC Austria/Germany Character Belt**							S
61-Character EBCDIC Denmark/Norway Character Belt**							S
61-Character EBCDIC Finland/Sweden Character Belt**							S
63-Character EBCDIC Spanish Speaking Character Belt**							S
61-Character EBCDIC Portuguese Character Belt**							S
Device Adapter*	O	O					
66-Key US EBCDIC Typewriter Keyboard*			O	O			
78-Key US EBCDIC Typewriter Keyboard*			O	O			
66-Key US EBCDIC Data Entry Keyboard*			O	O			
66-Key US EBCDIC Data Entry Keyboard - Keypunch Layout*			O	O			
78-Key US Operator Console Keyboard*			O	O			
66-Key US ASCII Typewriter Keyboard			O†††	O			
78-Key US ASCII Typewriter Keyboard			O†††	O			
Selector Pen*			O	O			
Printer Adapter*			O				
Operator Identification Card Reader*			O	O			
1,200-bps Transmission Speed*		O	O				
4800/7200-bps Transmission Speed*		O†	O†				
Audible Alarm*			O	O			
Dial*			O†				
Key Lock*			O	O			
Line Adapter*			O				
Line Adapter, with Auto Answer*			O†				
Numeric Lock*			O	O			
Copy*		O‡					
Forms Stand*					O	O	O
World Trade Power 100V ± 10% - 60 Hz**	S	S	S	S	S	S	S
World Trade Power 100V ± 10% - 50 Hz**	S	S	S	S	S	S	S
World Trade Power 110V ± 10% - 50 Hz**	S	S	S	S	S	S	S
World Trade Power 123.5V ± 10% - 50 Hz**	S	S	S	S	S	S	S
World Trade Power 200V ± 10% - 50 Hz**	S	S					
World Trade Power 200V ± 10% - 60 Hz**	S	S					
World Trade Power 220V ± 10% - 50 Hz**	S	S	S	S	S	S	S
World Trade Power 235V ± 10% - 50 Hz**	S	S	S	S	S	S	S

Legend:

S - Specify features
O - Special features
* - Features available to World Trade and US customers.
** - Features available to World Trade customers only.
*** - Feature available for 3271 and 3275; models 11 and 12 only.
† - Feature available for 3271 or 3275, as indicated; models 1 and 2 only.
†† - Feature available for 3275, models 1 and 2, and 3277 when attached to a 3271 model 1 or 2.
††† - Feature available for 3275, models 1 and 2.
‡ - Available as a feature for the 3271 models 1 and 2.

Table B-1. Features List (Cont)

Feature Name	Control Units		Display Stations		Printers		
	3272	3271	3275	3277	3284	3286	3288
66-Key Austrian/German Typewriter Keyboard**			O	O			
78-Key Austrian/German Typewriter Keyboard**			O	O			
66-Key Austrian/German Data Entry Keyboard**			O	O			
66-Key Austrian/German Data Entry Keyboard - Keypunch Layout**			O	O			
66-Key Belgian Typewriter Keyboard**,***			O	O			
78-Key Belgian Typewriter Keyboard**,***			O	O			
66-Key Data Entry Belgian Data Entry Keyboard**			O	O			
66-Key Data Entry Belgian Data Entry Keyboard - Keypunch Layout**,***			O	O			
66-Key Danish Typewriter Keyboard**			O	O			
78-Key Danish Typewriter Keyboard**			O	O			
66-Key Danish Data Entry Keyboard**			O	O			
66-Key Danish Data Entry Keyboard - Keypunch Layout**			O	O			
66-Key Finnish/Swedish Typewriter Keyboard**			O	O			
78-Key Finnish/Swedish Typewriter Keyboard**			O	O			
66-Key Finnish/Swedish Data Entry Keyboard**			O	O			
66-Key Finnish/Swedish Data Entry Keyboard - Keypunch Layout**			O	O			
66-Key French Typewriter Keyboard**,***			O	O			
78-Key French Typewriter Keyboard**,***			O	O			
66-Key French Data Entry Keyboard**,***			O	O			
66-Key French Data Entry Keyboard - Keypunch Layout**,***			O	O			
66-Key Italian Typewriter Keyboard**,***			O	O			
78-Key Italian Typewriter Keyboard**,***			O	O			
66-Key Italian Data Entry Keyboard**,***			O	O			
66-Key Italian Data Entry Keyboard - Keypunch Layout**,***			O	O			
66-Key Norwegian Typewriter Keyboard			O	O			
78-Key Norwegian Typewriter Keyboard			O	O			
66-Key Norwegian Data Entry Keyboard			O	O			
66-Key Norwegian Data Entry Keyboard - Keypunch Layout**,***			O	O			
66-Key Portuguese Typewriter Keyboard**			O	O			
78-Key Portuguese Typewriter Keyboard**			O	O			
66-Key Portuguese Data Entry Keyboard**			O	O			
66-Key Portuguese Data Entry Keyboard - Keypunch Layout**,***			O	O			
66-Key Spanish Typewriter Keyboard**			O	O			
78-Key Spanish Typewriter Keyboard**			O	O			
66-Key Spanish Data Entry Keyboard**			O	O			
66-Key Spanish Data Entry Keyboard - Keypunch Layout**,***			O	O			
66-Key United Kingdom Typewriter Keyboard**			O	O			
78-Key United Kingdom Typewriter Keyboard**			O	O			
66-Key United Kingdom Data Entry Keyboard**			O	O			
66-Key United Kingdom Data Entry Keyboard - Keypunch Layout**,***			O	O			
Character Generator Language:							
American/English*			S	S	S	S	
United Kingdom**			S	S	S	S	
Austria/Germany**			S	S	S	S	
Belgium/France**			S	S	S	S	
Denmark/Norway**			S	S	S	S	
Finland/Sweden**			S	S	S	S	
Italy**			S	S	S	S	
Spanish**			S	S	S	S	
Portuguese**			S	S	S	S	
English Nomenclature*	S	S	S	S	S	S	S
French Nomenclature**	S	S	S	S	S	S	S
German Nomenclature**	S	S	S	S	S	S	S
Italian Nomenclature**	S	S	S	S	S	S	S
Spanish Nomenclature**	S	S	S	S	S	S	S
Japanese Nomenclature**	S	S	S	S	S	S	S

Legend:

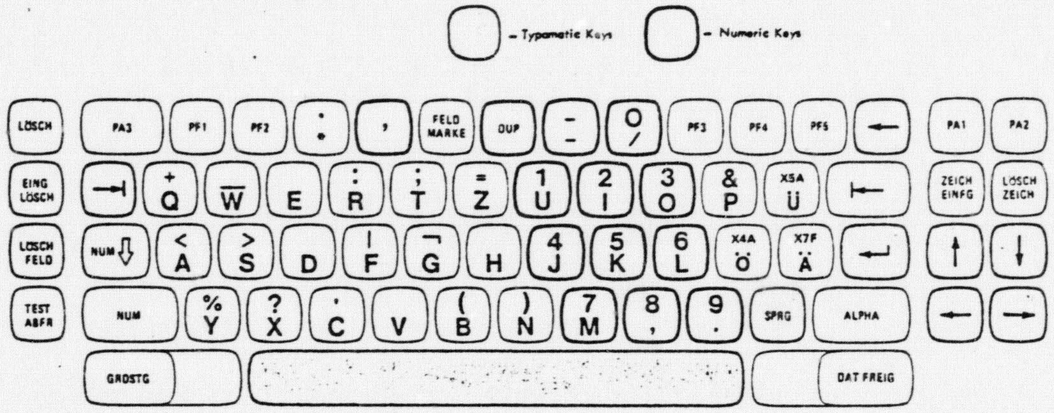
S - Specify Features

O - Special Features

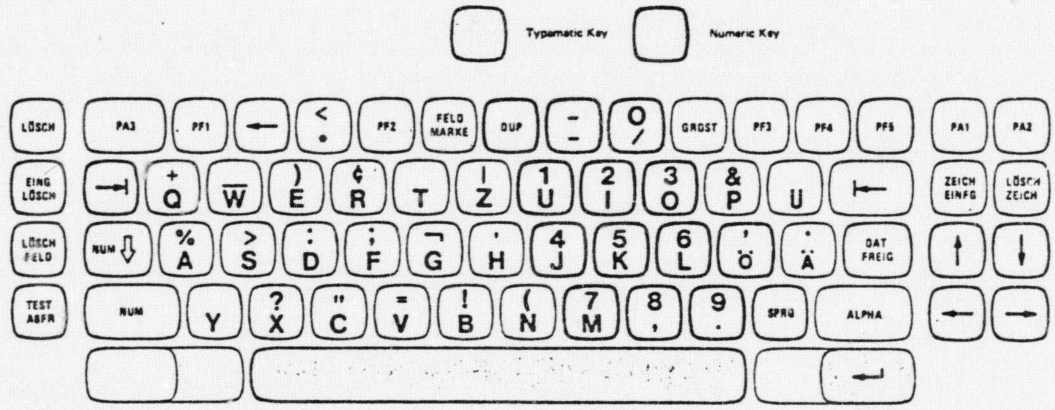
* - Features available to World Trade and US customers.

** - Features available to World Trade customers only.

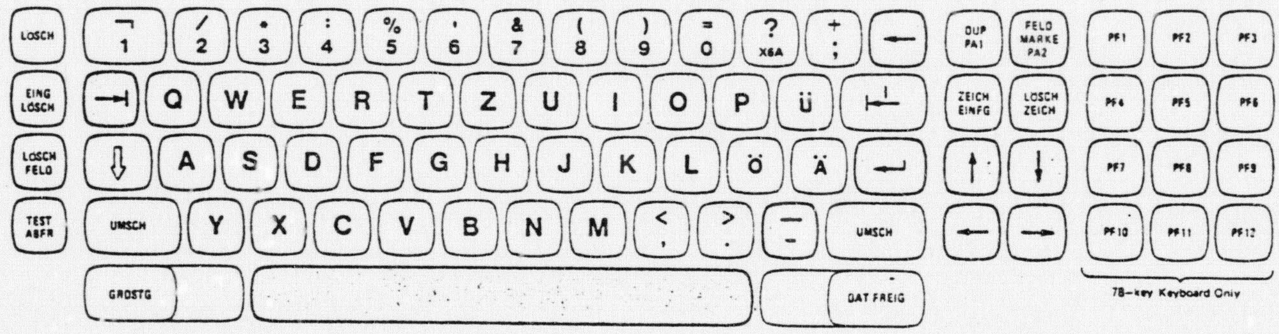
*** - Display Stations attaching to Belgian, French, or Italian keyboards require the American English Character Generator.


Typematic Keys
Numeric Keys
LÖSCH
PA3
PF1
PF2
FELD MARKE
DUP
PF3
PF4
PF5
PA1
PA2
EING LÖSCH
Q W E R T Z U I O P Ü
X5A
ZEICH EINFG
LÖSCH ZEICH
LÖSCH FELD
NUM
A S D F G H J K L Ö Ä
X4A
X7F
TEST ABFR
NUM
Y X C V B N M
SPRG
ALPHA
GROSTG
DAT FREIG

Data Entry Keyboard

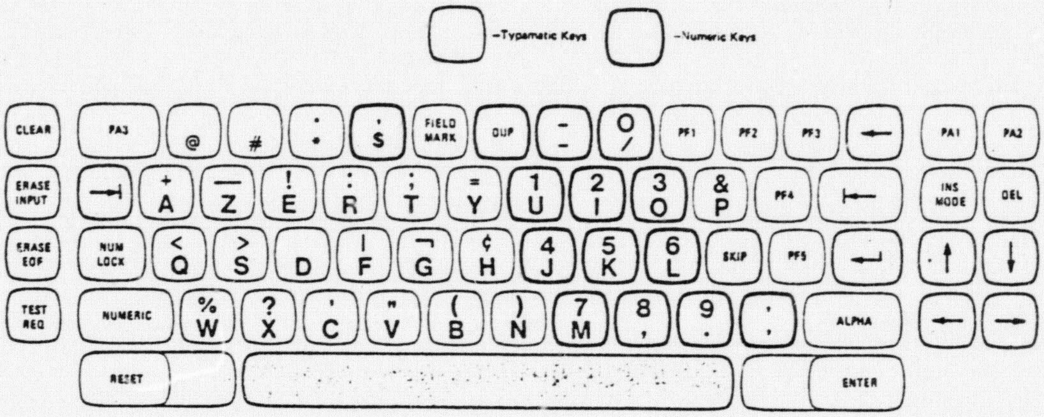

Typematic Key
Numeric Key
LÖSCH
PA3
PF1
PF2
FELD MARKE
DUP
GROST
PF3
PF4
PF5
PA1
PA2
EING LÖSCH
Q W E R T Z U I O P Ü
ZEICH EINFG
LÖSCH ZEICH
LÖSCH FELD
NUM
A S D F G H J K L Ö Ä
DAT FREIG
TEST ABFR
NUM
Y X C V B N M
SPRG
ALPHA

Data Entry Keyboard-Keypunch Layout

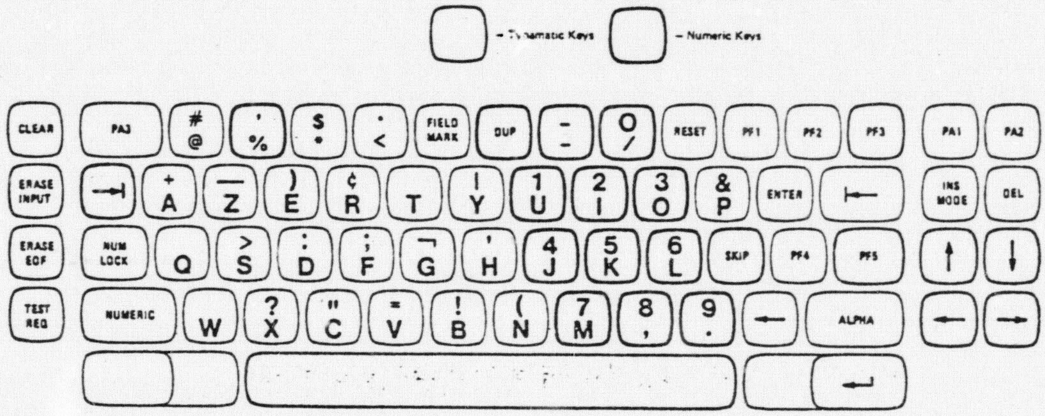

LÖSCH
1 2 3 4 5 6 7 8 9 0
X6A
DUP PA1
FELD MARKE PA2
PF1
PF2
PF3
EING LÖSCH
Q W E R T Z U I O P Ü
ZEICH EINFG
LÖSCH ZEICH
PF4
PF5
PF6
LÖSCH FELD
A S D F G H J K L Ö Ä
PF7
PF8
PF9
TEST ABFR
UMSCH
Y X C V B N M
UMSCH
PF10
PF11
PF12
GROSTG
DAT FREIG
78–key Keyboard Only

Typewriter Keyboard

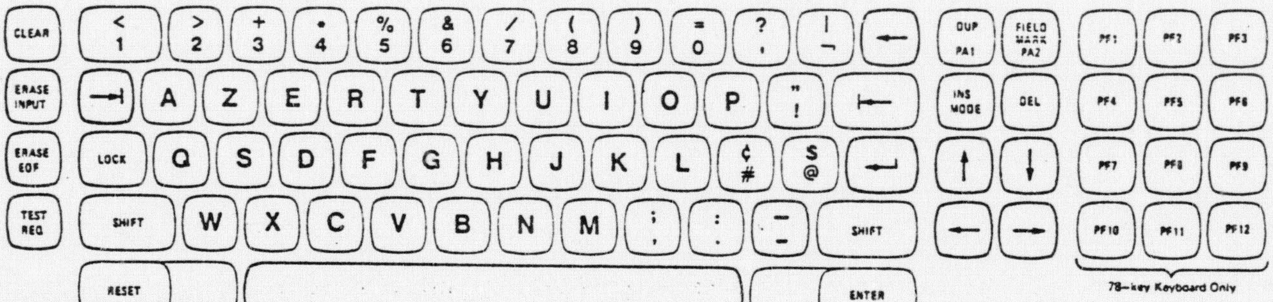
Figure B-1. Austrian/German Keyboards


– Typematic Keys
– Numeric Keys
CLEAR PA3 @ # : • ; $ FIELD MARK DUP – – O / PF1 PF2 PF3 PA1 PA2
ERASE INPUT + A — Z ! E : R ; T = Y 1 U 2 I 3 O & P PF4 INS MODE DEL
ERASE EOF NUM LOCK < Q > S D | F ¬ G ¢ H 4 J 5 K 6 L SKIP PF5
TEST REQ NUMERIC % W ? X ' C " V (B) N 7 M 8 , 9 . ; , ALPHA
RESET ENTER

Data Entry Keyboard


– Typematic Keys
– Numeric Keys
CLEAR PA3 # @ ' % $ • : < FIELD MARK DUP – – O / RESET PF1 PF2 PF3 PA1 PA2
ERASE INPUT + A — Z) E ¢ R T | Y 1 U 2 I 3 O & P ENTER INS MODE DEL
ERASE EOF NUM LOCK Q > S : D ; F ¬ G ' H 4 J 5 K 6 L SKIP PF4 PF5
TEST REQ NUMERIC W ? X " C = V ! B (N 7 M 8 , 9 . ALPHA

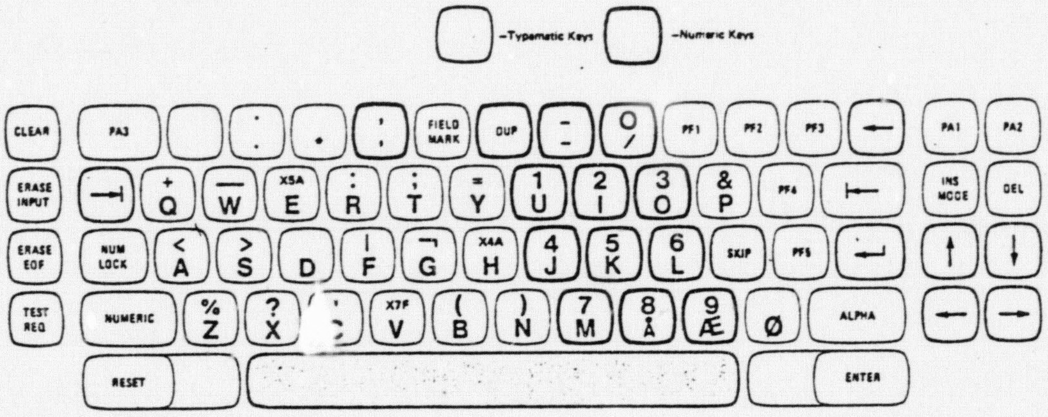
Data Entry Keyboard-Keypunch Layout


CLEAR < 1 > 2 + 3 • 4 % 5 & 6 / 7 (8) 9 = 0 ? ' | ¬ DUP PA1 FIELD MARK PA2 PF1 PF2 PF3
ERASE INPUT A Z E R T Y U I O P " ! INS MODE DEL PF4 PF5 PF6
ERASE EOF LOCK Q S D F G H J K L ¢ # $ @ PF7 PF8 PF9
TEST REQ SHIFT W X C V B N M ; , : . – – SHIFT PF10 PF11 PF12
RESET ENTER
78–key Keyboard Only

Typewriter Keyboard

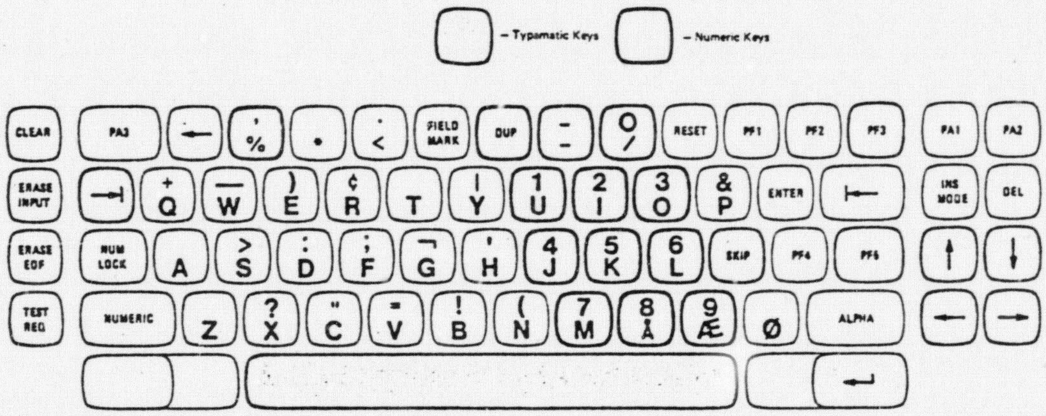
Figure B-2. Belgian Keyboards

00846



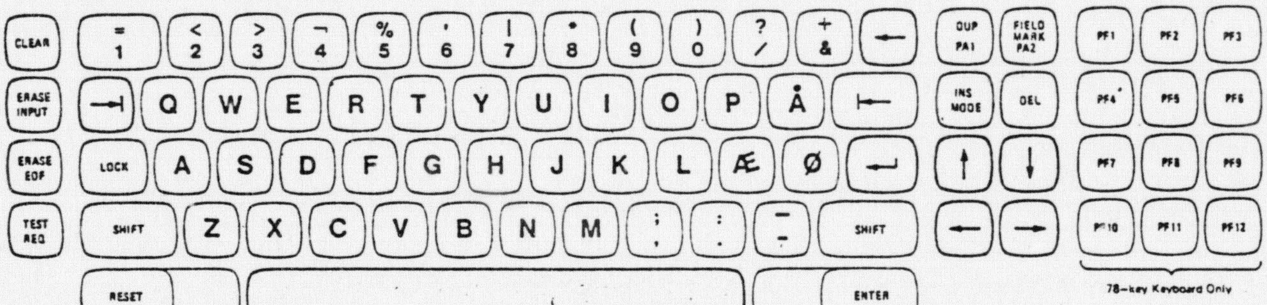
–Typematic Keys
–Numeric Keys
CLEAR
PA3
FIELD MARK
DUP
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
X5A
PF4
INS MODE
DEL
ERASE EOF
NUM LOCK
X4A
SKIP
PF5
TEST REQ
NUMERIC
X7F
ALPHA
RESET
ENTER

Data Entry Keyboard



– Typematic Keys
– Numeric Keys
CLEAR
PA3
FIELD MARK
DUP
RESET
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
ENTER
INS MODE
DEL
ERASE EOF
NUM LOCK
SKIP
PF4
PF5
TEST REQ
NUMERIC
ALPHA

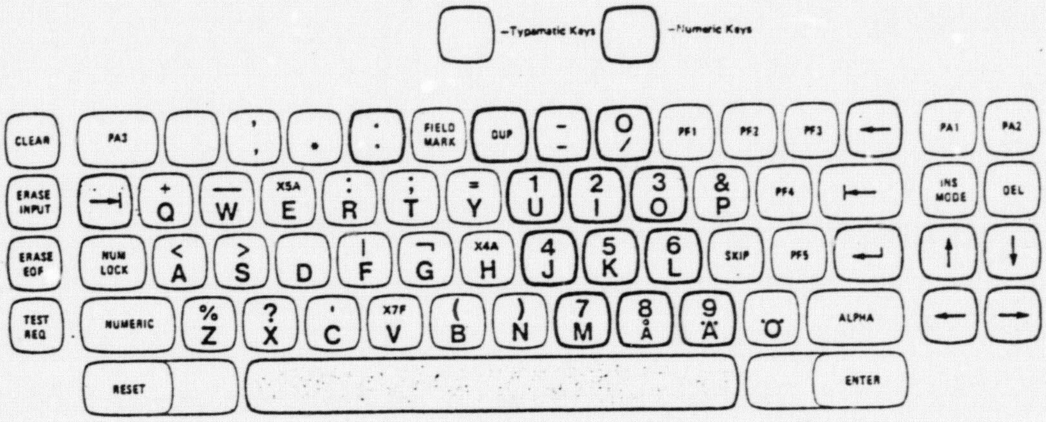
Data Entry Keyboard-Keypunch Layout



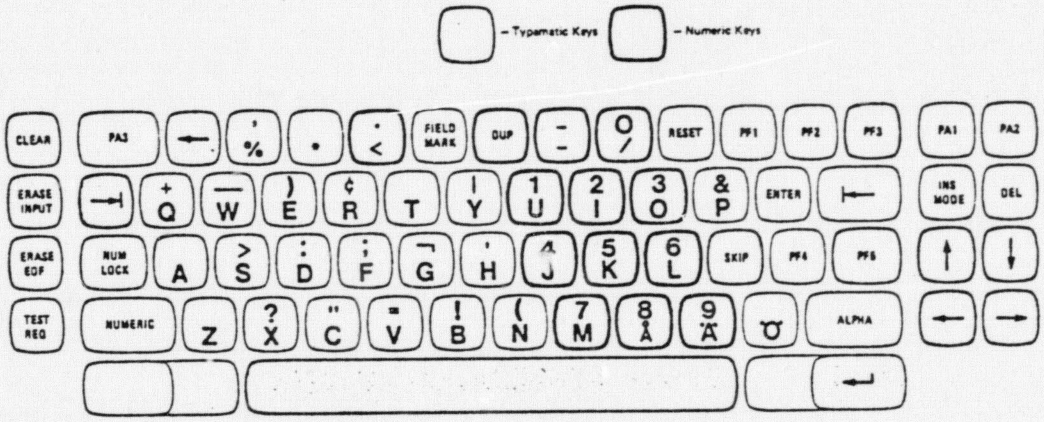
CLEAR
DUP PA1
FIELD MARK PA2
PF1
PF2
PF3
ERASE INPUT
INS MODE
DEL
PF4
PF5
PF6
ERASE EOF
LOCK
PF7
PF8
PF9
TEST REQ
SHIFT
SHIFT
PF10
PF11
PF12
RESET
ENTER
78–key Keyboard Only

Typewriter Keyboard

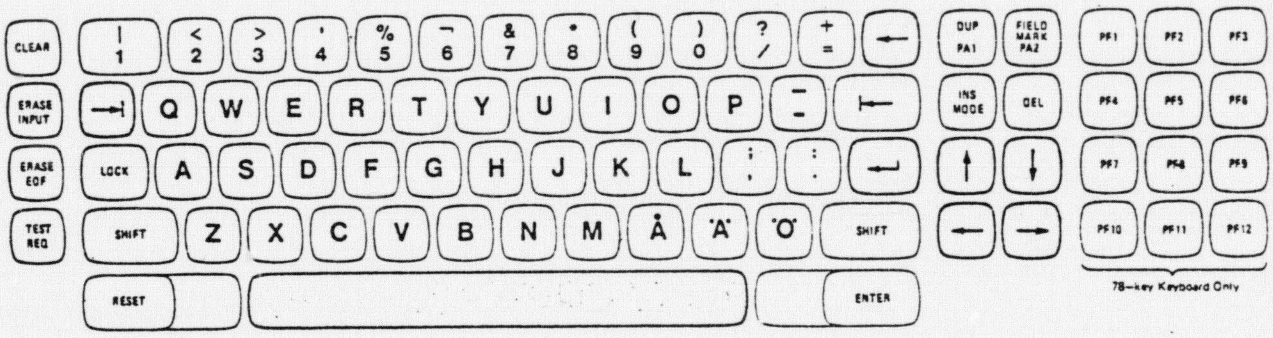
Figure B-3. Danish Keyboards


–Typematic Keys
–Numeric Keys
CLEAR
PA3
FIELD MARK
DUP
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
Q W E R T Y U I O P
X5A
PF4
INS MODE
DEL
ERASE EOF
NUM LOCK
A S D F G H J K L
X4A
SKIP
PF5
TEST REQ
NUMERIC
Z X C V B N M Å Ä Ö
X7F
ALPHA
RESET
ENTER

Data Entry Keyboard

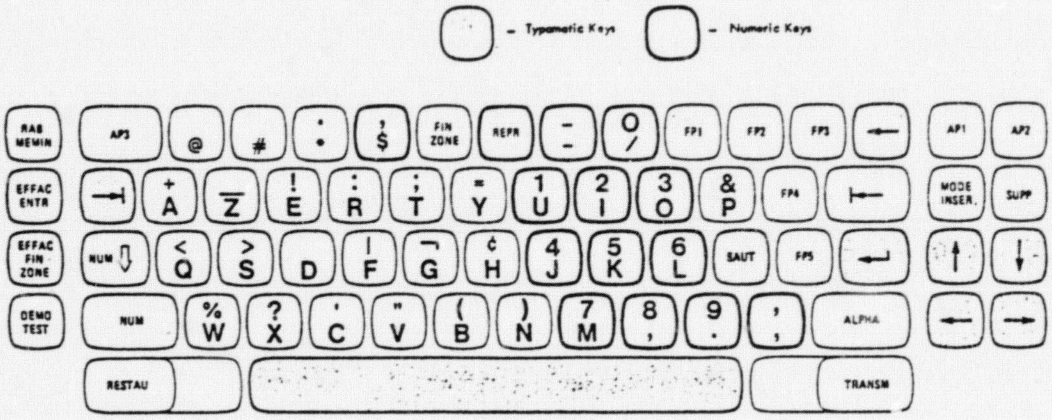

– Typematic Keys
– Numeric Keys
CLEAR
PA3
FIELD MARK
DUP
RESET
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
Q W E R T Y U I O P
ENTER
INS MODE
DEL
ERASE EOF
NUM LOCK
A S D F G H J K L
SKIP
PF4
PF5
TEST REQ
NUMERIC
Z X C V B N M Å Ä Ö
ALPHA

Data Entry Keyboard-Keypunch Layout

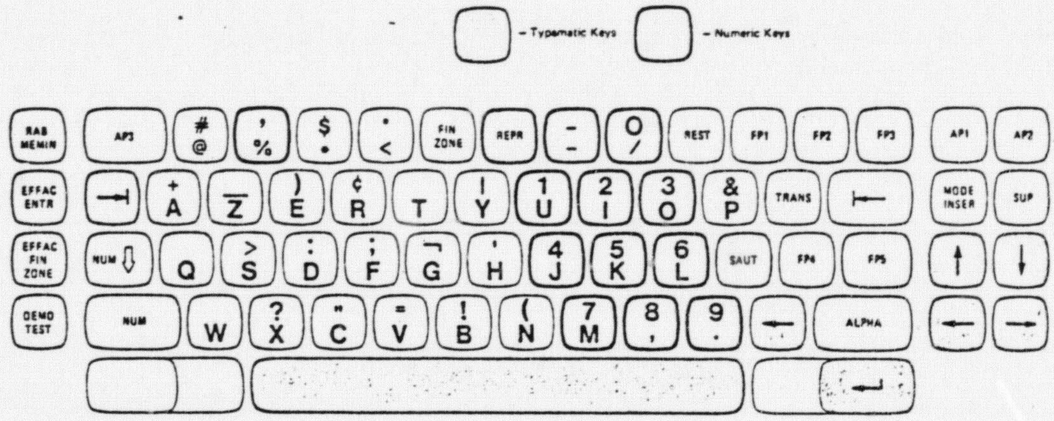

CLEAR
1 2 3 4 5 6 7 8 9 0
DUP PA1
FIELD MARK PA2
PF1
PF2
PF3
ERASE INPUT
Q W E R T Y U I O P
INS MODE
DEL
PF4
PF5
PF6
ERASE EOF
LOCK
A S D F G H J K L
PF7
PF8
PF9
TEST REQ
SHIFT
Z X C V B N M Å Ä Ö
SHIFT
PF10
PF11
PF12
RESET
ENTER
78–key Keyboard Only

Typewriter Keyboard

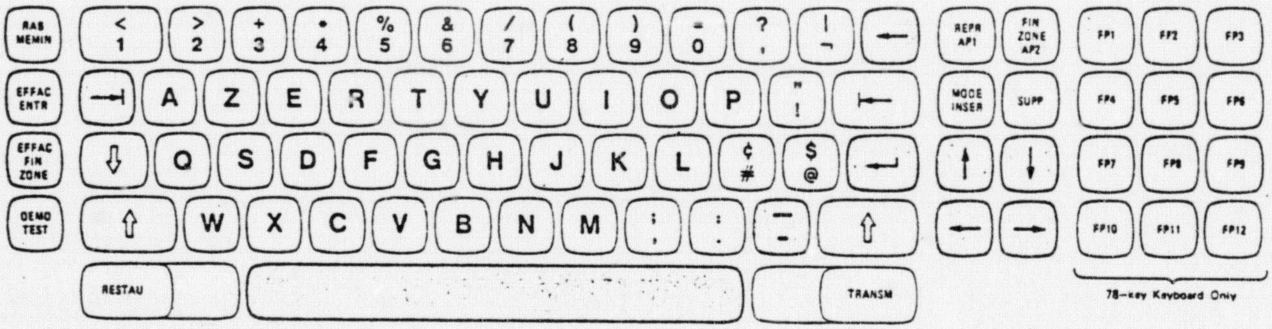
Figure B-4. Finnish/Swedish Keyboards


– Typamatic Keys
– Numeric Keys
RAB MEMIN, AP3, @, #, : •, , $, FIN ZONE, REPR, – –, 0 /, FP1, FP2, FP3, ←, AP1, AP2
EFFAC ENTR, →|, + A, Z, ! E, : R, ; T, = Y, 1 U, 2 I, 3 O, & P, FP4, |←, MODE INSER., SUPP
EFFAC FIN ZONE, NUM ⇩, < Q, > S, D, | F, ¬ G, ¢ H, 4 J, 5 K, 6 L, SAUT, FP5, ↵, ↑, ↓
DEMO TEST, NUM, % W, ? X, ' C, " V, (B,) N, 7 M, 8 ,, 9 ., ' ;, ALPHA, ←, →
RESTAU, TRANSM

Data Entry Keyboard

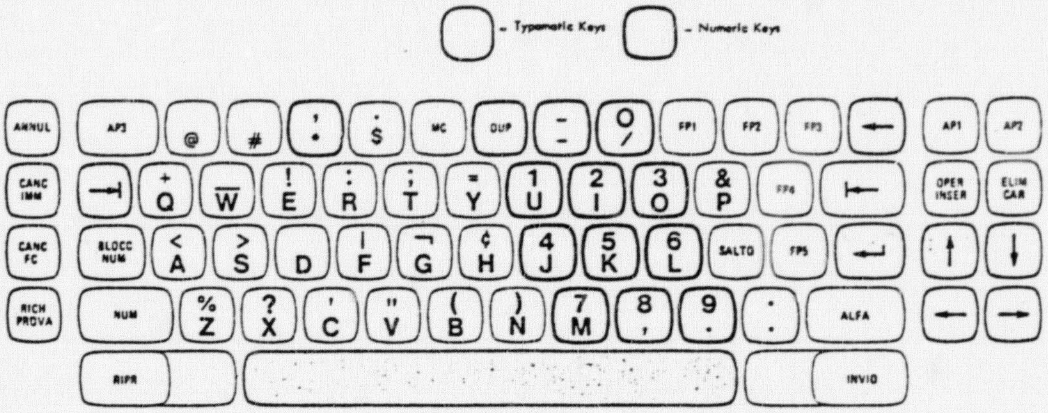

– Typamatic Keys
– Numeric Keys
RAB MEMIN, AP3, # @, ' %, $ •, • <, FIN ZONE, REPR, – –, 0 /, REST, FP1, FP2, FP3, AP1, AP2
EFFAC ENTR, →|, + A, Z,) E, ¢ R, T, | Y, 1 U, 2 I, 3 O, & P, TRANS, |←, MODE INSER, SUP
EFFAC FIN ZONE, NUM ⇩, Q, > S, : D, ; F, ¬ G, ' H, 4 J, 5 K, 6 L, SAUT, FP4, FP5, ↑, ↓
DEMO TEST, NUM, W, ? X, " C, = V, ! B, (N, 7 M, 8 ,, 9 ., ←, ALPHA, ←, →
↵

Data Entry Keyboard-Keypunch Layout

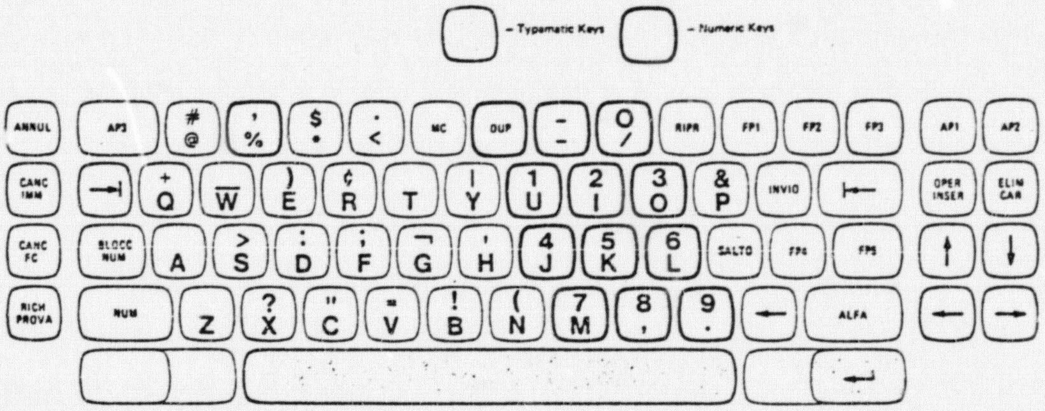

RAB MEMIN, < 1, > 2, + 3, • 4, % 5, & 6, / 7, (8,) 9, = 0, ? ,, ! ¬, ←, REPR AP1, FIN ZONE AP2, FP1, FP2, FP3
EFFAC ENTR, →|, A, Z, E, R, T, Y, U, I, O, P, " !, |←, MODE INSER, SUPP, FP4, FP5, FP6
EFFAC FIN ZONE, ⇩, Q, S, D, F, G, H, J, K, L, ¢ #, $ @, ↵, ↑, ↓, FP7, FP8, FP9
DEMO TEST, ⇧, W, X, C, V, B, N, M, ; ,, : ., – –, ⇧, ←, →, FP10, FP11, FP12
RESTAU, TRANSM
78–key Keyboard Only

Typewriter Keyboard

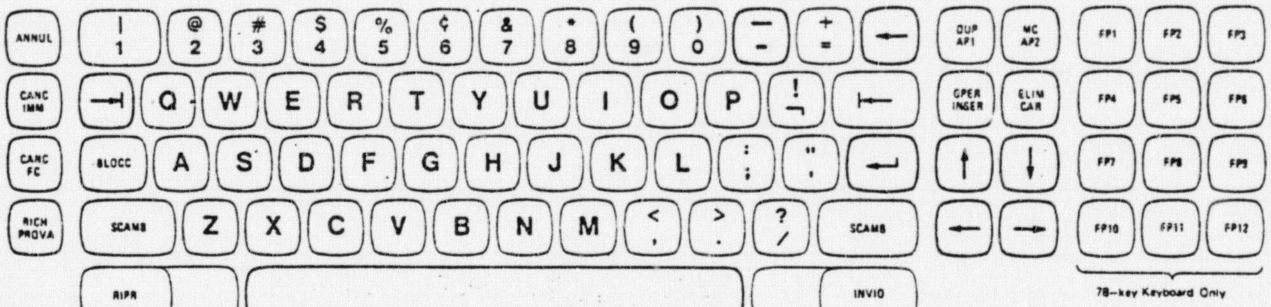
Figure B-5. French Keyboards


- Typematic Keys
- Numeric Keys
ANNUL
AP3
@
#
;
$
MC
DUP
0 /
FP1
FP2
FP3
AP1
AP2
CANC IMM
+ Q
W
! E
: R
; T
= Y
1 U
2 I
3 O
& P
FP4
OPER INSER
ELIM CAR
CANC FC
BLOCC NUM
< A
> S
D
| F
¬ G
¢ H
4 J
5 K
6 L
SALTO
FP5
RICH PROVA
NUM
% Z
? X
' C
" V
(B
) N
7 M
8 ,
9 .
ALFA
RIPR
INVIO

Data Entry Keyboard

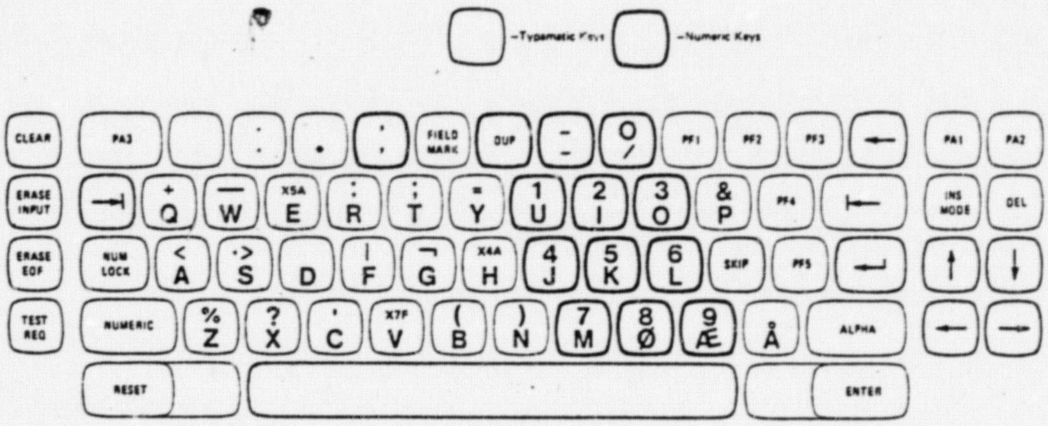

- Typematic Keys
- Numeric Keys
ANNUL
AP3
# @
' %
$ •
: <
MC
DUP
0 /
RIPR
FP1
FP2
FP3
AP1
AP2
CANC IMM
+ Q
W
) E
¢ R
T
| Y
1 U
2 I
3 O
& P
INVIO
OPER INSER
ELIM CAR
CANC FC
BLOCC NUM
A
> S
: D
; F
¬ G
' H
4 J
5 K
6 L
SALTO
FP4
FP5
RICH PROVA
NUM
Z
? X
" C
= V
! B
(N
7 M
8 ,
9 .
ALFA

Data Entry Keyboard-Keypunch Layout

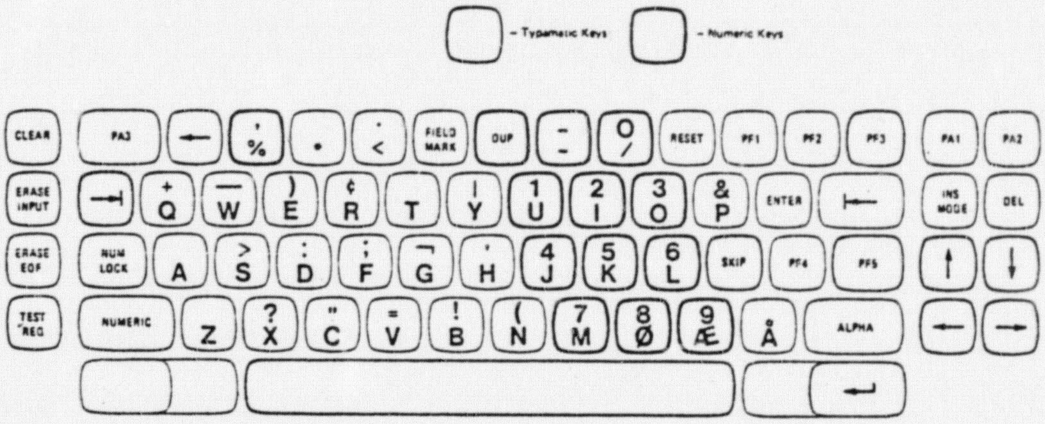

ANNUL
| 1
@ 2
# 3
$ 4
% 5
¢ 6
& 7
* 8
(9
) 0
_ -
+ =
DUP AP1
MC AP2
FP1
FP2
FP3
CANC IMM
Q
W
E
R
T
Y
U
I
O
P
! ¬
OPER INSER
ELIM CAR
FP4
FP5
FP6
CANC FC
BLOCC
A
S
D
F
G
H
J
K
L
: ;
" '
FP7
FP8
FP9
RICH PROVA
SCAMB
Z
X
C
V
B
N
M
< ,
> .
? /
SCAMB
FP10
FP11
FP12
RIPR
INVIO
78-key Keyboard Only

Typewriter Keyboard

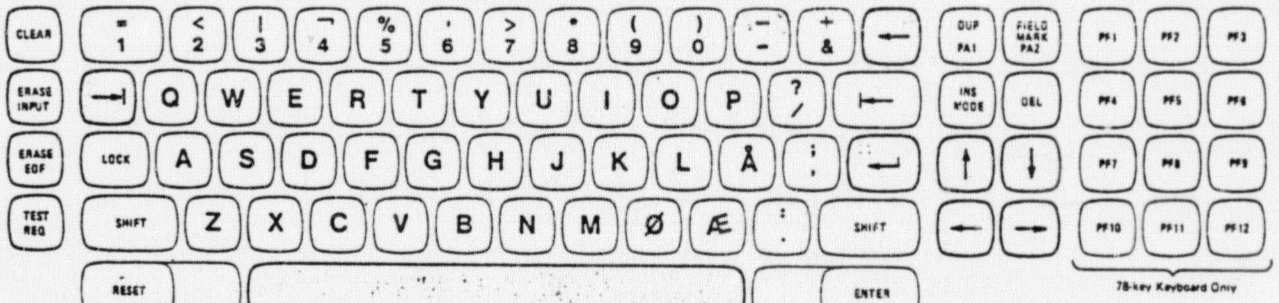
Figure B-6. Italian Keyboards


Typematic Keys
Numeric Keys
CLEAR PA3 : . ; FIELD MARK DUP - _ 0 / PF1 PF2 PF3 ← PA1 PA2
ERASE INPUT ⇥ + Q — W X5A E : R ; T = Y 1 U 2 I 3 O & P PF4 ⇤ INS MODE DEL
ERASE EOF NUM LOCK < A .> S D | F ¬ G X4A H 4 J 5 K 6 L SKIP PF5 ↵ ↑ ↓
TEST REQ NUMERIC % Z ? X ' C X7F V (B) N 7 M 8 Ø 9 Æ Å ALPHA ← →
RESET ENTER

Data Entry Keyboard


Typematic Keys
Numeric Keys
CLEAR PA3 ← ' % . < FIELD MARK DUP - _ 0 / RESET PF1 PF2 PF3 PA1 PA2
ERASE INPUT ⇥ + Q — W) E ¢ R T | Y 1 U 2 I 3 O & P ENTER ⇤ INS MODE DEL
ERASE EOF NUM LOCK A > S : D ; F ¬ G ' H 4 J 5 K 6 L SKIP PF4 PF5 ↑ ↓
TEST REQ NUMERIC Z ? X " C = V ! B (N 7 M 8 Ø 9 Æ Å ALPHA ← →
↵

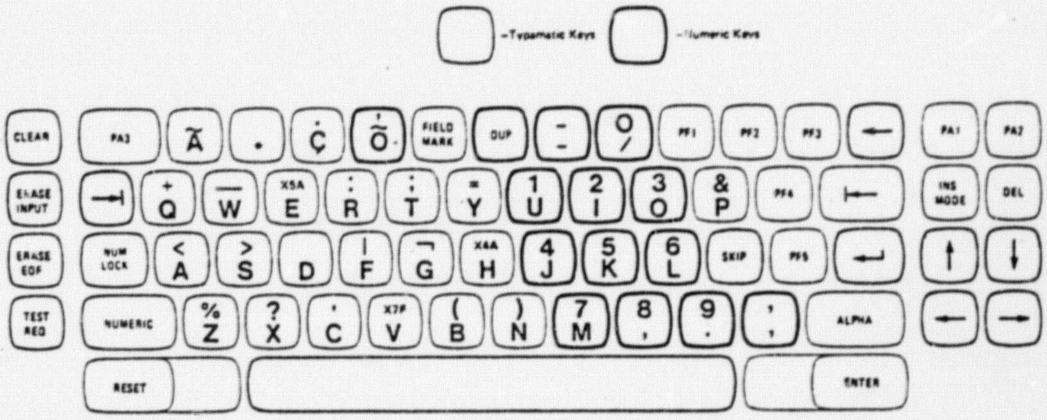
Data Entry Keyboard-Keypunch Layout


CLEAR = 1 < 2 | 3 ¬ 4 % 5 ' 6 > 7 * 8 (9) 0 — - + & ← DUP PA1 FIELD MARK PA2 PF1 PF2 PF3
ERASE INPUT ⇥ Q W E R T Y U I O P ? / ⇤ INS MODE DEL PF4 PF5 PF6
ERASE EOF LOCK A S D F G H J K L Å ; , ↵ ↑ ↓ PF7 PF8 PF9
TEST REQ SHIFT Z X C V B N M Ø Æ : . SHIFT ← → PF10 PF11 PF12
RESET ENTER
78-key Keyboard Only

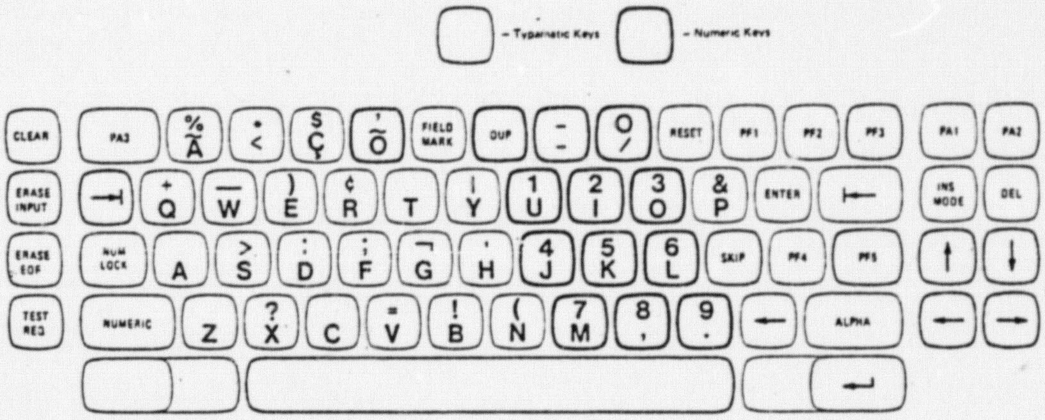
Typewriter Keyboard

Figure B-7. Norwegian Keyboards

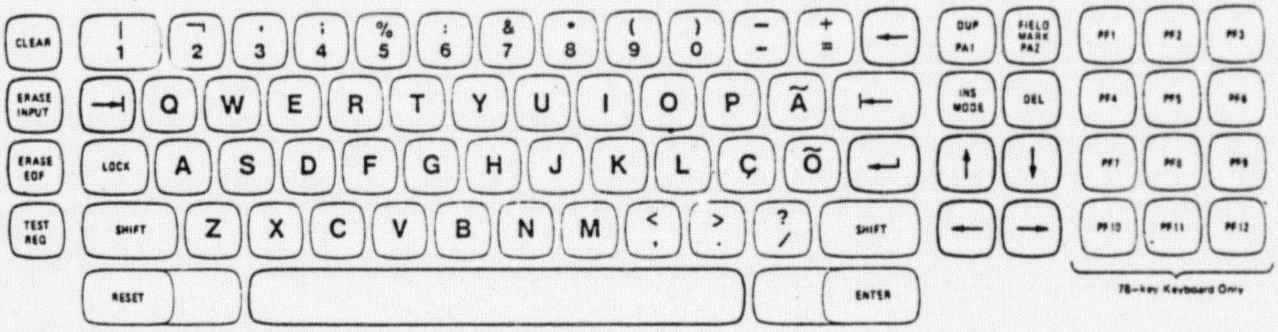
00851


– Typamatic Keys
– Numeric Keys
CLEAR PA3 Ã . Ç Õ FIELD MARK DUP - 0 / PF1 PF2 PF3 PA1 PA2
ERASE INPUT + Q — W X5A E : R ; T = Y 1 U 2 I 3 O & P PF4 INS MODE DEL
ERASE EOF NUM LOCK < A > S D | F ¬ G X4A H 4 J 5 K 6 L SKIP PF5
TEST REQ NUMERIC % Z ? X · C X7F V (B) N 7 M 8 , 9 . ; ALPHA
RESET ENTER

Data Entry Keyboard

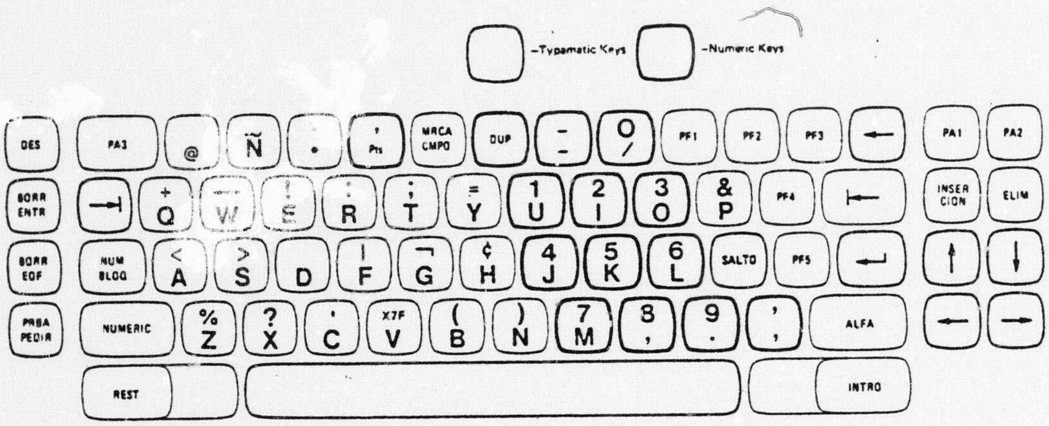

– Typamatic Keys
– Numeric Keys
CLEAR PA3 % Ã · < $ Ç ' Õ FIELD MARK DUP - 0 / RESET PF1 PF2 PF3 PA1 PA2
ERASE INPUT + Q — W) E ¢ R T | Y 1 U 2 I 3 O & P ENTER INS MODE DEL
ERASE EOF NUM LOCK A > S : D ; F ¬ G ' H 4 J 5 K 6 L SKIP PF4 PF5
TEST REQ NUMERIC Z ? X C = V ! B (N 7 M 8 , 9 . ALPHA

Data Entry Keyboard-Keypunch Layout

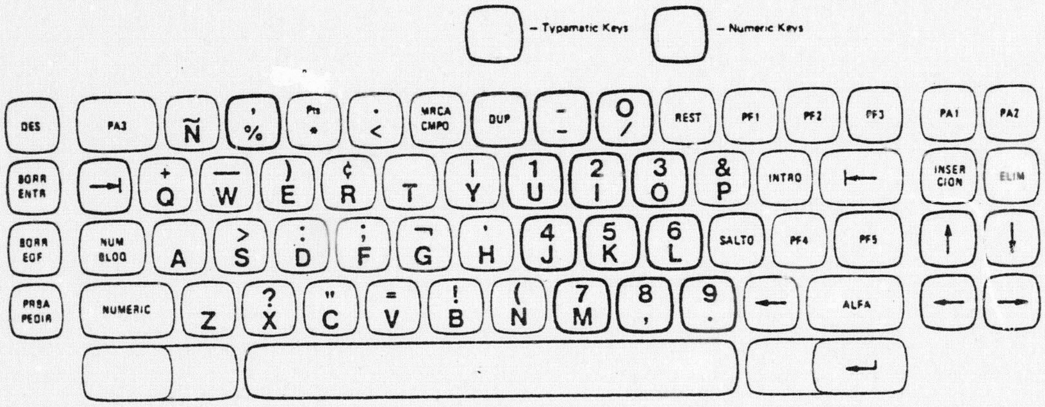

CLEAR | 1 ¬ 2 · 3 ; 4 % 5 : 6 & 7 • 8 (9) 0 — - + = DUP PA1 FIELD MARK PA2 PF1 PF2 PF3
ERASE INPUT Q W E R T Y U I O P Ã INS MODE DEL PF4 PF5 PF6
ERASE EOF LOCK A S D F G H J K L Ç Õ PF7 PF8 PF9
TEST REQ SHIFT Z X C V B N M < , > . ? / SHIFT PF10 PF11 PF12
RESET ENTER
78-key Keyboard Only

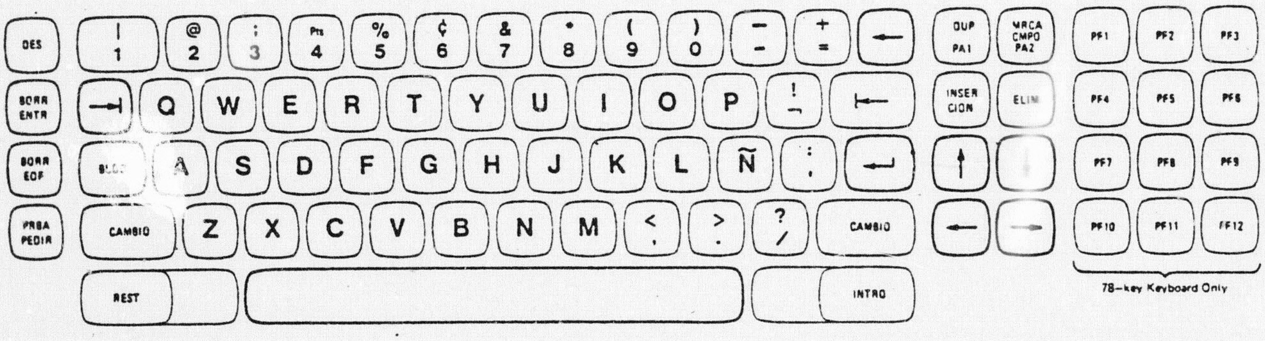
Typewriter Keyboard

Figure B-8. Portuguese Keyboards


–Typamatic Keys
–Numeric Keys
DES PA3 @ Ñ • ' Pts MRCA CMPO DUP – – O / PF1 PF2 PF3 ← PA1 PA2
BORR ENTR ⇥ + Q W ! E : R ; T = Y 1 U 2 I 3 O & P PF4 ⇤ INSER CION ELIM
BORR EOF NUM BLOQ < A > S D | F ¬ G ¢ H 4 J 5 K 6 L SALTO PF5 ↵ ↑ ↓
PRBA PEDIR NUMERIC % Z ? X ' C X7F V (B) N 7 M 8 , 9 . ' , ALFA ← →
REST INTRO

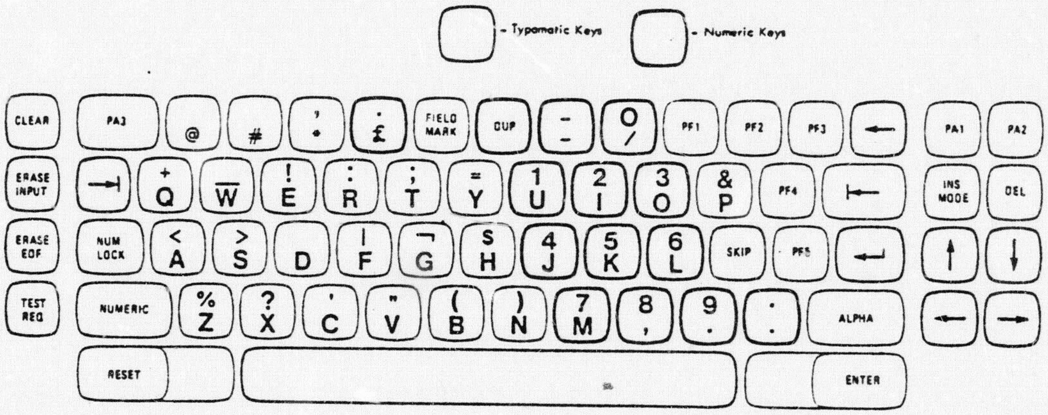
Data Entry Keyboard


– Typamatic Keys
– Numeric Keys
DES PA3 Ñ ' % Pts • : < MRCA CMPO DUP – – O / REST PF1 PF2 PF3 PA1 PA2
BORR ENTR ⇥ + Q — W) E ¢ R T | Y 1 U 2 I 3 O & P INTRO ⇤ INSER CION ELIM
BORR EOF NUM BLOQ A > S : D ; F ¬ G ' H 4 J 5 K 6 L SALTO PF4 PF5 ↑ ↓
PRBA PEDIR NUMERIC Z ? X " C = V ! B (N 7 M 8 , 9 . ← ALFA ← →
↵

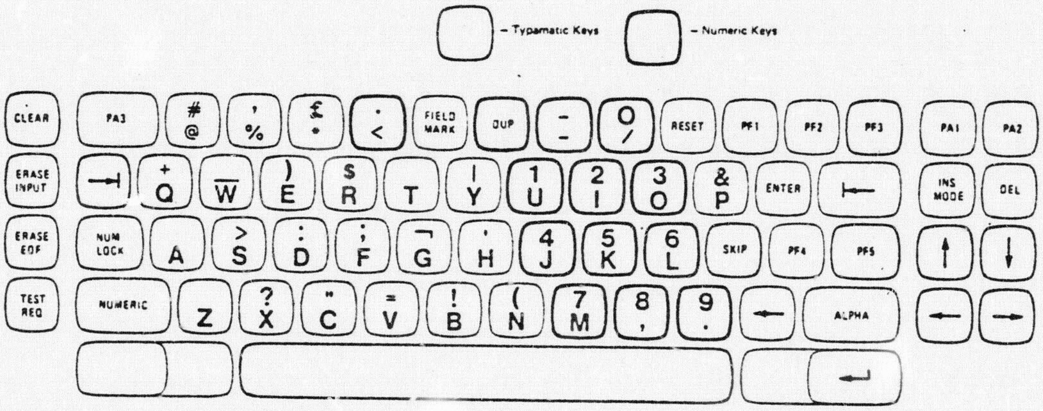

DES ! 1 @ 2 ; 3 Pts 4 % 5 ¢ 6 & 7 • 8 (9) 0 – – + = ← DUP PA1 MRCA CMPO PA2 PF1 PF2 PF3
BORR ENTR ⇥ Q W E R T Y U I O P ! ¬ ⇤ INSER CION ELIM PF4 PF5 PF6
BORR EOF BLOQ A S D F G H J K L Ñ : ; ↵ ↑ ↓ PF7 PF8 PF9
PRBA PEDIR CAMBIO Z X C V B N M < , > . ? / CAMBIO ← → PF10 PF11 PF12
REST INTRO
78–key Keyboard Only

Typewriter Keyboard

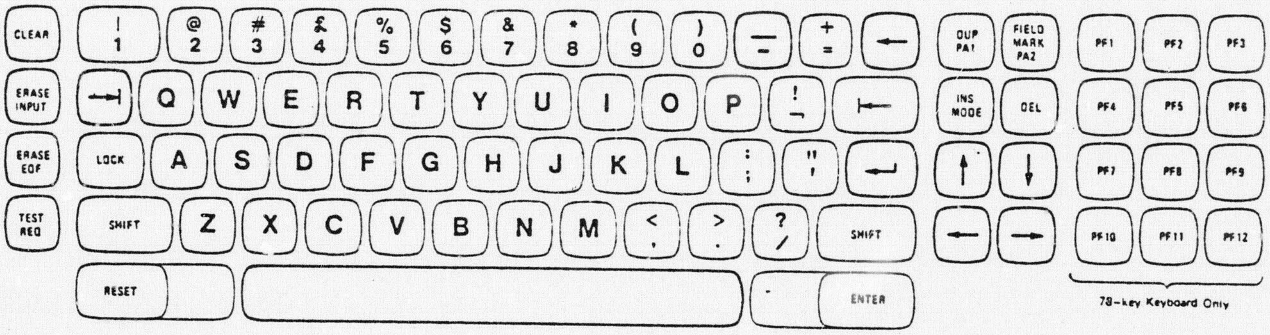
Figure B-9. Spanish Keyboards


- Typamatic Keys
- Numeric Keys
CLEAR
PA3
FIELD MARK
DUP
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
PF4
INS MODE
DEL
ERASE EOF
NUM LOCK
SKIP
PF5
TEST REQ
NUMERIC
ALPHA
RESET
ENTER

Data Entry Keyboard


- Typamatic Keys
- Numeric Keys
CLEAR
PA3
FIELD MARK
DUP
RESET
PF1
PF2
PF3
PA1
PA2
ERASE INPUT
ENTER
INS MODE
DEL
ERASE EOF
NUM LOCK
SKIP
PF4
PF5
TEST REQ
NUMERIC
ALPHA

Data Entry Keyboard-Keypunch Layout


CLEAR
DUP PA1
FIELD MARK PA2
PF1
PF2
PF3
ERASE INPUT
INS MODE
DEL
PF4
PF5
PF6
ERASE EOF
LOCK
PF7
PF8
PF9
TEST REQ
SHIFT
SHIFT
PF10
PF11
PF12
RESET
ENTER
78-key Keyboard Only

Typewriter Keyboard

Figure B-10. United Kingdom Keyboards

Appendix C. Data Analysis - APL Feature Character Set

This appendix is divided into two parts. Part 1 shows the characters generated with APL "off" (lowercase and uppercase), with APL "on" (lowercase and uppercase), and with APL "on" in combination with APL ALT. Part 2 shows the available TN character set and also the way in which substitution of APL characters may be used to generate the desired characters.

1.

APL OFF		APL ON			APL ON with APL ALT	
Lowercase Shift	Uppercase Shift	Lowercase Shift	Uppercase Shift			
a	A	A	α	(alpha)	A̲	
b	B	B	⊥	(base)	B̲	
c	C	C	∩	(cap)	C̲	
d	D	D	⌊	(downstile)	D̲	
e	E	E	∊	(epsilon)	E̲	
f	F	F	_	(underbar)	F̲	
g	G	G	∇	(del)	G̲	
h	H	H	∆	(delta)	H̲	
i	I	I	⍳	(iota)	I̲	
j	J	J	∘	(null)	J̲	
k	K	K	'	(quote)	K̲	
l	L	L	⎕	(quad)	L̲	
m	M	M	∣	(stile)	M̲	
n	N	N	⊤	(top)	N̲	
o	O	O	○	(circle)	O̲	
p	P	P	⋆	(star)	P̲	
q	Q	Q	?	(query)	Q̲	
r	R	R	⍴	(rho)	R̲	
s	S	S	⌈	(upstile)	S̲	
t	T	T	∼	(tilde)	T̲	
u	U	U	↓	(down)	U̲	
v	V	V	∪	(cup)	V̲	
w	W	W	⍵	(omega)	W̲	
x	X	X	⊃	(close shoe)	X̲	
y	Y	Y	↑	(up)	Y̲	
z	Z	Z	⊂	(open shoe)	Z̲	
1	|	1	¨	(dieresis)	⌶	(I beam)
2	@	2	¯	(overbar)	⍫	(del tilde)
3	#	3	<	(less)	⍒	(del stile)
4	$	4	≤	(not greater)	⍋	(delta stile)
5	%	5	=	(equal)	⌽	(circle stile)
6	¢	6	≥	(not less)	⍉	(circle slope)
7	&	7	>	(greater)	⊖	(circle bar)
8	* (asterisk)	8	≠	(not equal)	⍟	(log)
9	(	9	∨	(or)	⍱	(nor)
0	)	0	∧	(and)	⍲	(nand)
-	_	+	−	(bar)	!	(quote dot)
=	+	X	÷	(divide)	⌹	(domino)
¬	!	←	→	(right)	⍞	(quote quad)
;	:	[	(	(open paren)	⍎	(base null)
'	"	]	)	(close paren)	⍕	(top null)
,	<	,	;	(semi colon)	⍝	(cap null)
.	>	.	:	(colon)	⍀	(slope bar)
/	?	/	\	(slope)	⌿	(slash bar)

2. The 3270 with the Data Analysis - APL Feature provides the capability of screen display and printer output of the TN character set. In addition, most of these characters may be directly entered from the 3270 Data Analysis - APL Feature keyboard. Included is a listing of the TN characters, along with the means of directly entering each character or a recommended substitution of one or two characters to be used for each character.

The following TN characters may be directly entered on the keyboard (see Part 1 of this appendix for proper setting of shift or APL ON/OFF keys).

space	1
A–Z (uppercase)	26
a–z (lowercase)	26
0–9 (numeric)	10
↓ ↑ ≤≥≠[ ]← →\ | (APL special characters)	.1
- = ¬ ; ' , . / $ % c & • ( ) – + ! : " < >? (non-APL special characters)	23

The following 36 characters, though they may not be directly entered, may be entered through use of the recommended substitution of APL characters not used in the above set. Note that a user's application program would have the responsibility for decoding these substitutions.

TN Character	Keyboard Substitute (All with APL "on")	TN Character	Keyboard Substitute (All with APL "on")
Subscript 1	⌊1 (APL downstile + digit)	° (degree)	○ (APL null)
Subscript 2	⌊2 (APL downstile + digit)	±	⍎ (APL base null)
Subscript 3	⌊3 (APL downstile + digit)	(	∇ (APL del)
Subscript n	⌊N (APL downstile + digit)	)	Δ (APL delta)
Superscript 0	⌈0 (APL upstile + digit)	¤	⎕ (APL quad)
Superscript 1	⌈1 (APL upstile + digit)	■	⌹ (APL domino)
Superscript 2	⌈2 (APL upstile + digit)	∘	⍟ (APL log)
Superscript 3	⌈3 (APL upstile + digit)	┐	⊃ (APL close shoe)
Superscript 4	⌈4 (APL upstile + digit)	┌	∩ (APL cap)
Superscript 5	⌈5 (APL upstile + digit)	└	⊂ (APL open shoe)
Superscript 6	⌈6 (APL upstile + digit)	┘	∪ (APL cup)
Superscript 7	⌈7 (APL upstile + digit)	┬	⊤ (APL top)
Superscript 8	⌈8 (APL upstile + digit)	├	⌿ (APL slash bar)
Superscript 9	⌈9 (APL upstile + digit)	┴	⊥ (APL base)
Superscript (	⌈((APL upstile + char)	┤	⍀ (APL slope bar)
Superscript +	⌈+ (APL upstile + char)	+	÷ (APL divide)
Superscript)	⌈) (APL upstile + char)	--	¯ (APL overbar)
Superscript -	⌈- (APL upstile + char)		

Glossary

access method: A technique for moving data between main storage and an input/output device.

alphameric field: A field that may contain any alphabetic, numeric, or special character that is available on any of the 3270 keyboards.

alphameric keyboard: A typewriter-like keyboard used to enter letters, numbers, and special characters into a display station buffer; also used to perform special functions (such as backspacing) and to produce special control signals.

application program: A program written by a user that applies to his own work.

ASCII (American National Standard Code for Information Interchange X3.4-1968): A standard code consisting of control characters and graphic characters; used for information interchange between data processing and communication systems and associated equipment.

attention: An I/O interruption signal generated by a display station, usually as the result of an action taken by the operator of the device.

attribute: A characteristic of a display field. The attributes of a display field include: protected or unprotected; numeric only or alphameric input control; displayed, nondisplayed, display intensified; selector pen detectable or nondetectable; and modified or not modified.

attribute character: A code that defines the attributes of the display field that follows. An attribute character is the first character in a display field but is not a displayable character.

buffer: The hardware portion of a display station, control unit, or buffered printer in which display or print data is stored.

buffer address: The address of a location in the buffer at which one character can be stored.

channel interface: The communication link between the channel unit and its attached control units, consisting of shared control and data lines.

character addressing: The process of gaining access to any character position in the buffer by using an address.

character generator: A hardware unit (contained in 3275 and 3277 display stations) that converts the digital code for a character into signals that cause the cathode-ray tube electron beam to create the character on the screen.

character position: A location on the screen at which one character can be displayed; also, an addressed location in the buffer at which one character can be stored.

clocking: Time base control signals within the 3271 control unit, 3275 display station, or associated modems; regulate the bit rate of information transfer between a computer system and a remotely attached 3270 display system.

command: An instruction that directs a control unit or device to perform an operation or a set of operations.

control character: A character used in conjunction with a Write command to specify that a control unit is to perform a particular operation.

cursor: A unique symbol (an underscore) that identifies a character position in a screen display, usually the character position at which the next character entered from the keyboard will be displayed.

data-entry keyboard: A standard typewriter keyboard on which the numeric keys are grouped in a format similar to the numeric keys on a card punch keyboard (to facilitate entry of numeric data). Two types of data entry keyboards are available: the data entry keyboard and the data entry keyboard-keypunch layout. Both types of layout resemble key layouts found on IBM keypunch units. Other features include (1) automatic upshift of the keyboard when the cursor enters a numeric-only display field and (2) automatic prevention of entry of nonnumeric characters into a numeric-only display field when the special Numeric Lock feature is installed.

data set: See modem.

data stream: All data transmitted through a channel in a single read or write operation to display station or printer.

detectable: An attribute of a display field; determines whether the field can be sensed by the selector pen.

display field: A group of consecutive characters (in the buffer) that starts with an attribute character (defining the characteristics of the field) and contains one or more alphameric characters. The field continues to, but does not include, the next attribute character.

display operator: A person who uses the keyboard or selector pen to perform operations at a display station.

EBCDIC: Extended Binary Coded Decimal Interchange Code.

end of message: A character in the data stream transmitted to a printer; marks the end of the data to be printed.

field: See *display field.*

formatted display: A screen display in which a display field (or fields) has been defined as a result of storing at least one attribute character in the display buffer.

hardware: Refers to the electronic circuits (within the units of the 3270 system) that perform various data transfer and control functions.

input field: An unprotected field in which data can be entered, modified, or erased by any keyboard action.

intensified display: An attribute of a display field that causes data in that field to be displayed at a brighter level than other data displayed on the screen.

leased line: See *nonswitched line.*

*modem (*also called *data set):* A coupline device providing signal conversion functions required for transfer of information between a remote display system and telephone lines and, also, between telephone lines and computer equipment.

new line: A code sent to a printer; causes the printer to begin printing subsequent characters on a new line.

nonswitched line: (also called *leased line*) A connection between a remote terminal and a computer that does not have to be established by dialing.

null character: An all-zero character that occupies a position in the storage buffer and is displayed as a blank.

null suppression: In reading the contents of the buffer for a display or printer, the bypassing of all null characters in order to reduce the amount of data to be transmitted or printed.

order code: A code that may be included in the write data stream transmitted for a display station or printer; provides additional formatting or definition of the write data.

polling: A technique by which terminals sharing a communication line are periodically interrogated to determine whether the terminals require service.

program access (PA) keys: Allow a code to be transmitted to the program to identify which key was pressed, but no input data from the screen is transmitted to the program.

program function (PF) keys: Allow input data on the display screen to be transmitted to the program together with a code that identifies which program key was depressed.

protected field: A display field for which the display operator cannot use the keyboard to enter, modify, or erase data.

read-modified operation: An operation in which only those display fields that are operator-modified with null codes suppressed are transferred.

selector pen: A pen-like instrument which may be attached to the display station as a special feature. When pointed at a detectable portion of an image and then activated, the selector pen senses the presence of light at a display field and identifies that portion of the displayed message for entry into the data processing system.

selector pen attention: An interruption generated when a selector pen detect occurs on a display field that has a null or space designator character. The attention concludes the selector pen operation.

switched line: (also called *dial line*) A communication line in which the connection between the computer and a remote station is established by dialing.

time sharing: Refers to the interleaved use of the operating time of a device.

unformatted display: A screen display in which no attribute character (and, therefore, no display field) has been defined; the attributes of the displayed data are controlled by the hardware of the display device.

unprotected field: A display field for which the display station operator can use the keyboard to enter, modify, or erase data.

wraparound: The continuation of an operation (for example, a read operation or a cursor movement operation) from the last character position in a buffer to the first character position in the buffer.

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BEFORE THE

Federal Communications Commission

WASHINGTON, D. C. 20554

In the Matter of

AMERICAN TELEPHONE AND TELEGRAPH)
COMPANY (AT&T))
) Transmittal No. 12449
Revision to Tariffs FCC Nos. 260)
and 267 (Dataspeed 40 Service))

RESPONSE OF COMPUTER AND BUSINESS EQUIPMENT MANUFACTURERS ASSOCIATION (CBEMA) TO APPLICATION FOR REVIEW

The Computer and Business Equipment Manufacturers Association (CBEMA),[1] by its attorneys, responds herein to the Application for Review filed by AT&T in the above-referenced matter. AT&T seeks to overturn the Memorandum Opinion and Order of the Chief, Common Carrier Bureau (Mimeo No. 61760, released March 3, 1976) (hereinafter "Order") which rejected AT&T's offering of Dataspeed 40 computer terminal equipment as patently inconsistent with the Commission's Computer Inquiry Rules and policies and thus unlawful. For the reasons stated below, CBEMA urges the Commission to affirm the Bureau Chief's ruling that the Dataspeed 40 equipment was improperly offered under tariff as a communications service.

---

[1] CBEMA has participated in the proceeding leading to the Order under review here through its Telecommunications Committee which includes the following members: Addressograph Multigraph Corporation; Burroughs Corporation; Control Data Corporation; Dictaphone Corporation; General Electric Company; Hewlett-Packard Company; Honeywell Information System, Inc.; IBM Corporation; Monroe, The Calculator Company; NCR Corporation; Olivetti Corporation of America; Sanders Associates, Inc.; Sperry/UNIVAC; Tektronix, Inc.; Xerox Corporation and 3M Company.

The AT&T tariff offering of Dataspeed 40 service presents the question of the application of the policies underlying the Commission's Computer Inquiry, as well as the rules resulting from that proceeding, to the provision of data processing terminal equipment. As AT&T has argued, the Dataspeed 40 tariff raises critical questions as to the role of the carriers in providing tariffed services to data processing customers.[1] For this reason, the review and disposition by the Commission of the issues resulting from the AT&T Application for Review is appropriate and will serve to settle areas of uncertainty regarding equipment like the Dataspeed 40. The Commission's role in such a review is not limited, like that of an appellate court, to a finding that the Order is supported by substantial evidence or procedural fairness. Rather *de novo* consideration of all aspects of the issues and the ruling below is within the scope of a review of action taken pursuant to delegated authority.[2]

---

[1] AT&T Application for Review at 1-2:

> The Order of the Bureau Chief is of great significance because it necessarily will determine the role to be played by carriers in the provision of services to data communications users. The Order is based on a determination of what kinds of services will be considered data communications services as opposed to data processing services.

[2] Sections 5(d)(5), (6) of the Communications Act make clear the Commission's authority to conduct a *de novo* review based on the record developed below:

> (5) In passing upon applications for review, the Commission may grant, in whole or in part, or deny such applications without specifying any reasons therefor. No such application for review

(Footnote continued on next page)

Summary of CBEMA Position

In considering the factual background pertinent to a review of the issues, the Commission need not look beyond the record that has been created below. From the pleadings and information submitted by the parties, the function of the Dataspeed 40 items in "inputting" and "outputting" data for a central processing computer is clear.[1] Similarly, it is clear that the Dataspeed 40 items are new entrants by the Bell System into a highly competitive field of "smart" data terminals.[2] The facts also reveal that the Dataspeed 40 items were developed

---

Footnote 2/ from preceding page:

> shall rely on questions of fact or law upon which the panel of commissioners, individual commissioner, employee board, or individual employee has been afforded no opportunity to pass.
>
> (6) If the Commission grants the application for review, it may affirm, modify, or set aside the order, decision, report, or action, or it may order a rehearing upon such order, decision, report, or action in accordance with section 405.

See also, §1.115(i) of the Commission's Rules.

[1] The Bell System concedes this point in its Application, p. 5, 7-8.

[2] *See e.g.*, New York Telephone Co., Description of Service, *infra*, p. 12; *Order*, p. 6.

by the Bell System and manufactured by Teletype Corporation,[1] although the costs involved in the design, development and manufacturing processes have not been fully identified for review.[2]

As to the conclusions to be drawn from these facts, the Commission's Computer Inquiry and other proceedings[3] have outlined the relevant criteria followed by the Bureau and pertinent here. The Computer Inquiry enunciated a firm policy of preventing the carriers from entering the data processing field with data processing services under tariff. In view of the fact that non-carrier data processing firms were dependent on the carriers for communications services needed to provide data processing, the Commission in the Computer Inquiry made the public interest judgment that maximum separation of the carriers from their competitive data processing affiliates would prevent ongoing problems of discrimination in favor of the carrier affiliates.[4] The maximum separation rule also affirmed the Commission's view that competitive services should be removed from any subsidies by monopoly services insofar as possible in order to safeguard the monopoly ratepayers.[1]

---

[1] AT&T Application, p. 19 NOTE.

[2] The cross-subsidy problems with the Dataspeed 40 items were raised by CBEMA in its Petition for Relief and Reply to Opposition below and in its Petition for Limited Review herein. These pleadings are incorporated herein by reference.

[3] In the Matter of Regulatory and Policy Problems Present by the Interdependence of Computers and Communication Services, 28 F.C.C.2d 267 (1971); see also, Land Mobile Services, 51 F.C.C.2d 945 (1975); FCC Report No. 2050, released April 26, 1976.

[4] The recent SICOM decision is an application of the maximum separation policy.

Thus, the tools are readily at hand for a dispositive Commission decision on the policy questions raised by the offering of the Dataspeed 40 items under tariff. The facts of the offering are laid out in the Order and the pleadings, and the controlling policies have been applied by the Bureau to this particular equipment offering within the scope of its delegated authority. That is, the Bureau found that the Dataspeed 40 items were so tied to their programmed role in a data processing system that they constituted an integral part of a data processing service which could not be offered under tariff by a common carrier. As an additional conclusion, the Bureau held that the design, development and manufacturing costs of the Dataspeed 40 were so poorly identified that a review of the filing could not disprove its cross-subsidy potential. In that event, the tariff was rejected under a standing Commission policy forbidding cross-subsidization of a competitive service with monopoly service revenues.

As CBEMA will show below, the record fully supports the Bureau's conclusion that the Dataspeed 40 items are computer terminals whose normal function is solely within a data processing system. Further, the record is convincing that numerous avenues for cross-subsidy of these items were available in their design, development and manufacturing processes,[2] raising serious questions which the Bell System did not resolve to the Bureau's satisfaction.[1/] On each of its grounds for decision therefore the Bureau should be affirmed, and affirmance on either should be sufficient to affirm the result reached by the Bureau.

---

[1] 28 F.C.C.2d at 268-70.

[2] CBEMA submitted a detailed discussion of the development of a new product by the Bell System and the possibilities for cross-subsidy in that process in its Reply to Opposition below and its Petition for Limited Review herein. These pleadings are hereby incorporated in this Response by reference.

Notwithstanding the Bureau's rulings on the basis of established policy, AT&T argued in its Application that "novel", "far reaching" and "ground breaking" issues are involved in its tariff for data terminal equipment such that further proceedings may be required before final Commission action in this area.[2/] Despite the novelty of the issues emphasized by AT&T, the company then seeks to have its tariff for the very equipment in question placed into effect immediately. As stated above, CBEMA believes that no further proceedings are necessary for a decision on the merits of this case. Should the Commission be persuaded otherwise, however, and determine to pursue an inquiry into the proper mode of carrier offering for this type of terminal equipment in the future, then the orderly course of proceeding would be to leave the Bureau's decision standing under §5(d)(3)[3/] while the future regulatory scheme was devised. The Commission has ample authority under the Communications Act to hold a tariff filing for this equipment

---

[1/] Order, ¶19, 20.

[2/] Application, p. 22, 24.

[3/] Under §5(d)(3) of the Communications Act, the Bureau's Order will stand as effective agency action until modified or reversed.

in abeyance until the question of its appropriateness is resolved.[1]

Argument

I. The Bureau Correctly Found That The Dataspeed 40 Items Are Data Processing Terminals, The Provision of Which, Under the Circumstances Here, Constituted The Provision of Data Processing Service.

As noted above, AT&T bases its argument for reversal on its contention that the Dataspeed 40 items are an evolutionary stage of traditional communications equipment and that they perform an essentially communications function, i.e., talking to computers. The Bureau, on the other hand, found the Dataspeed 40 items to be in a class of computer terminals which "locally perform some of the functions which previously were performed by a data processing computer." Order, ¶16. Specifically, computer terminals like the Dataspeed 40 were found to perform "the input, output, formatting and conversion of computer-based data" in contrast to traditional communications terminals which merely facilitate the exchange of messages. Id. at ¶14. The description of the Dataspeed 40's functions and design in the record below fully support the distinction found by the Bureau between the Dataspeed 40 computer terminals and communications devices properly offered under tariff.

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[1] Under §203(b) of the Act, the Commission can extend the public notice period in particular instances such as tariff filings for similar equipment pending the conclusion of the rulemaking proceeding. Finally, the status quo could be maintained by an order placing a temporary hold on tariff filings for data terminals pending a decision on the terms and conditions of such filing under the precedent of American Commercial Lines v. Louisville & N. R. Co., 392 U.S. 571 (1968).

It is clear from the pleadings that the Dataspeed 40 items accomplish the tasks necessary to input data to and receive processed messages from a central processing computer. As AT&T concedes, "The Dataspeed 40 terminal -- like the lower speed teletypewriters -- provides customers with the capability of entering, displaying, editing, printing, transmitting and receiving data between two or more locations over a direct communications path."[1] Although AT&T contends that the above functions are communications functions because they do not alter the intelligence of the message, the essential role of these functions in inputting information for a data processing service places them clearly in the realm of data processing. The Bureau noted, for example, that the role of remote computer terminals in a data processing system was recognized by the Commission in the Computer Inquiry.[2] Significantly, the remote access data processing service, of which these terminals were recognized as an integral part, was singled out by the Commission for completely unregulated status, notwithstanding the fact that the terminals would be used to facilitate communications with the computer along with their primary input/output functions.[1]

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[1] AT&T Application, p. 7.

[2] The Order cites the definition of "remote access data processing" from Section 64.702(a)(4) of the Commission's Rules:

> "Remote Access Data Processing Service" is an offering of data processing wherein communications facilities, linking a central computer to remote customer terminals, provide a vehicle for the transmission of data between such computer and customer terminals.

AT&T does not deny that the Dataspeed 40 items perform the critical input and output functions in a data processing system. In fact, the Dataspeed 40 is marketed solely for use in data processing systems. In the tariff filing of New York Telephone Co., offering the Dataspeed 40 under intrastate tariffs, the terminals were advertised as satisfying "efficient data preparation and retrieval ... compatible with existing computer support systems."[2] New York Telephone continues with its account of the Dataspeed 40 as a Bell System offering for a major portion of the computer terminal market which uses display terminals (CRT's):

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[1] 28 F.C.C.2d at 297. It should be noted that the Commission declined to regulate even "hybrid data processing" services which include a terminal that performs incidental communications functions as well as its primary data processing functions. *Id.* at 278.

[2] New York Telephone's *Description of Service* for the Dataspeed 40 items was attached as Exhibit A to the Petition of International Business Machines Corporation (IBM) to Reject or Suspend AT&T Transmittal No. 12449, December 15, 1975.

> This type of cathode ray tube (CRT) accounts for approximately 54% of the total CRT market, according to an AT&T Market Study. It is particularly prevalent in the Brokerage, Financial, Airlines and Utilities industries. ... Synchronous clustered CRT's are typically found in large systems like customer information bureaus, airline reservation systems, order entry systems, and inquiry/response and message switching systems. [1]

Nothing in the above description or in other marketing surveys emphasizes the role of Dataspeed 40 for communications; rather its data processing applications are stressed.[2]

Finally, AT&T fails to shake the Bureau's conclusion that the Dataspeed 40 terminals are essentially different from basic communications terminals. Although each set of terminals "talks" to a receiving entity, basic telephone or telegraph instruments are merely passive devices which facilitate the exchange of messages exterior to their operations. The Dataspeed 40, like other computer terminals, are active devices which actually compose the message to be sent according to programmed instructions. The fact that the Dataspeed 40 cannot operate without specific programmed instructions tailored to the customer's computer is sufficient to distinguish these terminals from teletypewriters or other primarily communications

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1/ *Ibid.*

2/ *See*, *e.g.*, the market studies in the Record, Outlook For Computer Terminals in a Changing Competitive Environment, A. D. Little, June, 1975: and Remote Computer Markets, Communications, Terminals & Applications, 1974-1980, Volume Four, Quantum Science, 1975.

devices.[1]

In view of the foregoing, there obviously are sound reasons which support the Bureau's conclusion that AT&T is holding out a data processing service rather than a communications service. This advertisement of the Dataspeed 40 items as data processing terminals, coupled with their acknowledged role in data preparation, input and retrieval, belies any post hoc contention by AT&T that these items are simply advanced forms of basic telephone equipment.

II. Even If Under The Circumstances Here The Provision of Dataspeed 40 Equipment Did Not Constitute Provision of a Data Processing Service, The Conclusion Reached by the Bureau Would be Correct and Should be Upheld.

Even if the Commission should disagree with the Bureau's conclusion that provision of the Dataspeed 40 equipment as proposed by AT&T would not constitute the provision of a data processing service which the Bell System is barred from offering by the Computer Inquiry, the Bureau's rejection of the Dataspeed 40 tariff should still be affirmed. This is so because the Bureau action clearly implemented the Commission's expressed policy in the *Computer Inquiry* and other proceedings underscoring the critical importance of minimizing the opportunity for cross-subsidy of competitive services with monopoly service revenue. That is, the Bureau's *Order* relied on the *Computer Inquiry* for more than the definition of data processing. Central to the *Order* was a finding that the "costs associated with its design, development and manufacture, as submitted with this tariff filing, are not clearly separable from monopoly and other regulated common carrier activities." *Order*, ¶19. As a result, the Bureau concluded,

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[1] The absurdity of accepting AT&T's test of a communications terminal -- one which talks to a computer with its messages "controlled" by the customer -- can be seen by a practical application of such a view. A "money machine" or banking terminal talks to a computer, transmitting the messages desired by the customer. Yet it is clear that the mode or program which the terminal uses to translate the command, "give me $50 in cash" is much more than the passive conduct of the intelligence. A customer simply could not complete a transaction without the formatting and conversion of his message into the proper computer signals. A terminal which accomplishes this interface between customers and computers is a data processing terminal.

> ... the material submitted does not permit us to determine whether its development costs are subsidized, as the Commission in the Computer Inquiry contemplated could occur. Therefore, we conclude that the service offering is inconsistent with both the rule and policies established in the Computer Inquiry and is unlawful on its face.

Id. at 20. The Bureau's conclusion is amply supported by the record, undisturbed by the AT&T Application for Review and fully consistent with a strong Commission policy. On this ground alone, the result reached by the Bureau should be affirmed in a dispositive opinion by the Commission. Moreover, this policy against cross-subsidy is sufficiently basic and clear cut that the Commission could properly rely upon it to reject this tariff for the Dataspeed 40, apart from the proceedings below, on the basis of AT&T's failure to dispell the cross-subsidy questions surrounding this equipment.

The cross-subsidy holding cited by the Bureau from the Computer Inquiry arose in the context of data processing services offered by common carriers in competition with the data processing services offered by their customers, non-regulated computer industry firms. The Commission saw two grave possibilities in this arrangement that led to its requirement [illegible]imum separation, the possibility that the carrier's data processing service might receive favored treatment in communications services[1] and the possibility that monopoly service revenues might be used to subsidize a competitively priced data processing service.[2] In the latter event, the carriers might endanger the financial base necessary to support their monopoly services to the point where they shirked their "obligation ... to make available 'to all people ... adequate facilities at reasonable charges.'" 28 F.C.C.2d at 268. The offering of data processing services by a non-regulated subsidiary which would take tariffed communications service like any other customer of the carrier was seen as the most feasible method to prevent cross-subsidies and unreasonable discriminations by the carriers short of prohibiting their participation in the data processing field.[1/]

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[1] The complaint of Bunker Ramo Corp. against Western Union's SICOM service was used to illustrate this point, 28 F.C.C. 2d at 270, N. 5.

[2] See, generally, 28 F.C.C.2d at 268-70. The following four "areas of regulatory concern" summarize the Commission's strong policy against cross -subsidy as applied to the data processing field:

> (a) That the sale of data processing services by carriers should not adversely affect the provision of efficient and economic common carrier services;
>
> (b) That the costs related to the furnishing of such data processing services should not be passed on, directly or indirectly, to the users of common carrier services;
>
> (c) That revenues derived from common carrier services should not be used to subsidize any data processing services; and
>
> (d) That the furnishing of such data processing services by carriers should not inhibit free and fair competition between communication common carriers and data processing companies or otherwise involve practices contrary to the policies and prohibitions of the anti-trust laws. (Tentative Decision, para. 34).

28 F.C.C.2d at 269.

The teaching of the Computer Inquiry on prevention of cross-subsidy has been repeated in numerous contexts since the 1971 decision.[2/] In authorizing carriers to provide new competitive mobile radio services, for example, the Commission adopted a maximum separation policy to prevent cross-subsidy of the competitive mobile telephone services with monopoly service revenue and to prevent unlawful discrimination by carriers in the interconnection of the monopoly landline telephone network

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[1/] Id. at 270-71.

[2/] The Computer Inquiry maximum separation rules were applied most recently to Western Union's SICOM service. Relying on the fact that the offering of collateral data processing services with communications service was "in such a manner that it is nearly impossible to determine whether any cross-subsidy is flowing from the communications service to the data processing service", the Commission ordered Western Union to revise its tariff to delete the collateral data processing services. FCC Report No. 2050, released April 26, 1976.

with the mobile telephone services of their competitors.[1] The Commission explained the reasons for its strong measures against possible cross-subsidies:

> ... [O]ur reprehension of cross-subsidy is not grounded solely on the competitive evils we believe it may cause, as arguments based on 'Competitive Equalization' or on the Hawaiian Telephone case seem to assume. We are also concerned with consumers of the carriers' other services as well. If these other services are generating sufficient surplus revenues to subsidize a new offering at non-compensatory rates, consumers of existing services may be paying unreasonably high rates for them. We find that the requirement of corporate separation will significantly reduce the risk of cross-subsidy and, in addition, will make our supervision of this field's development much simpler and more effective ....

Land Mobile Services, 51 F.C.C.2d at 951 (1975).

Finally, the question of effective policies against cross-subsidy has been raised by the Commission in regard to the general terminal equipment field in Docket No. 20003. That proceeding is exploring all economic aspects of direct connection of customer-provided equipment used with the telephone network.[2]

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[1] Land Mobile Services in the 900 MHz Frequency Band, 51 F.C.C. 2d 945 (1975), aff'd sub nom. NARUC v. FCC, 525 F.2d 630 (D.C. Cir. 1976). The Commission's decision authorized a new class of mobile radio telephone carriers to use the cellular technology in providing mobile telephone service to the general public in competition with existing mobile telephone carriers. All mobile telephone services must necessarily interconnect with the landline telephone network in order to offer communications with more than the mobile system base station, and this requirement of interconnection via the monopoly local exchanges led the Commission to order local telephone companies to separate their monopoly exchange networks from their competitive mobile radio systems in the 900 MHz band.

[2] Notice of Inquiry, 49 F.C.C.2d 214 (1974).

As part of its efforts, the Commission asked for comments:

> "If the markets for interconnect equipment and systems do not have the unique characteristics which would warrant such monopoly treatment, we also solicit views as to what, if any, special conditions should be placed on telephone company participation in these markets. For example, should such suppliers of both monopoly and competitive services be required to establish separate corporate entities, maintain separate accounts, use separate operating personnel and facilities or adopt other measures to avoid the cross-subsidization of their competitive offerings by their monopoly services?"

Notice of Inquiry, 46 F.C.C.C2d 214, 218 (1974).

The Dataspeed 40 equipment at issue here presents a clear example of the problem troubling the Commission, as the Bureau recognized in its Order. With this offering AT&T is moving into the sophisticated data terminal field, a competitive foray which must necessarily involve substantial planning, design, manufacturing, marketing and financial resources.[1/] CBEMA demonstrated below and in its Petition for Limited Review that the costs incurred in designing, manufacturing and marketing the Dataspeed 40 items had never been identified by AT&T in such fashion as to show which Bell System funds were involved and particularly whether those funds were contributed by monopoly service revenues. AT&T did not deny below that

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[1/] CBEMA, Petition for Limited Review, April 2, 1976. By note 2 , p. 4 above, this Petition has been incorporated by reference herein.

such cost identification materials were needed or that the Bell System had failed to provide the full, required information. In its Application, AT&T still did not deny that the Commission needed the full information on such a "complex cost allocation question". Application, p. 19, Note. Rather, the company asserted that "all the costs associated with the 'design, development and manufacture' are completely segregated from any monopoly or other regulated common carrier activities of the Bell System." Ibid.[1/] This assertion concedes an awareness by AT&T that cross-subsidy is a fundamental concern of the Commission, as expressed in the Computer Inquiry and other proceedings, and stands as a virtual acknowledgement of AT&T's failure to submit the full information to satisfy the Bureau's cross-subsidy concerns and the Commission's Rules.[2/]

Thus, the Dataspeed 40 items present another "perfect illustration of the concerns which prompted [the] Computer Inquiry."[3/] AT&T now moves into direct competition with firms dependent on it for communications channels for their own data

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[1/] Since segregated cost figures for Dataspeed 40 items are apparently readily available, it is inexplicable that AT&T has failed to provide them.

[2/] Without prejudice to CBEMA's Petition for Limited Review, it should be noted that the Bureau's terse conclusion in ¶22 of the Order that Section 61 of the Commission's Rules was not violated by AT&T reflected the apparent determination that the matter had been disposed of on other grounds. It is clear from the Order however that cross-subsidy was a principal concern in rejecting the tariff.

[3/] SICOM Order, supra, at 3.

processing activities and those of their customers. The possibilities of favoring customers who use AT&T terminals in installation and repair of communications channels are obvious. Because of these problems, such competitive terminal equipment should not be offered under tariff by the Bell System. This conclusion is the essence of the Bureau's Order and it should be affirmed by the Commission in a clear statement of its policy. The utter failure of AT&T to meet the cross-subsidy issue, and provide the data required under Section 61.38 of the Rules to meet this issue, provides emphatic support for the conclusion reached by the Bureau as well as an independent basis for rejection of the tariff filing.

III. If Further Proceedings Are Necessary, the Commission Should Maintain the Status Quo Pending Their Outcome.

AT&T says the issues in this matter "will determine the future of common carrier provision of conventional data communications services". Application, p. 2. Further, the Company claims that the questions involved "have such an enormous impact on the whole communications industry and the using public" that this "matter of such moment requires plenary review by the Commission itself". *Id.*, p. 6, 3. As to the disposition of the case, AT&T comments,

> this case involves substantive issues of great importance and the Chief's decision involves the breaking of new ground in the area of what a carrier may or may not do with respect to data communications. The Chief has determined, on hiw [sic] own, *novel* questions of *far reaching* policy.

Id. at 22 (emphasis added). Despite its view of the weight and novelty of the issues involved, AT&T then urges that its tariff for Dataspeed 40 be put into effect immediately while the Commission pursues any proceedings it feels are necessary to resolve the policies to be pursued in this novel situation. Id. at 24.

For the reasons set out above, CBEMA does not believe further proceedings are needed; the result reached by the Bureau should be upheld. However, should the Commission conclude that some further inquiry would be warranted, it is apparent that, contrary to AT&T's position, the carrier should not be permitted to embark upon the concededly new and far-reaching course that it proposes without prior determination by the Commission of the policy issues upon which it may proceed. If the Commission agrees with AT&T that its proposal to provide Dataspeed 40 under tariff breaks new ground and that further inquiry is required, then the proper course of action would seem to be to devote the appropriate study and reflection to the best future regulatory design before deciding whether to reverse the Bureau and allow AT&T to implement one of the choices now open. As AT&T points out, the Bureau's Order will stand as effective agency action unless it is specifically reversed by the Commission. Application, p. 24. Thus, if the Bureau is not reversed pending the disposition of any further proceedings, the status quo will be maintained pending disposition of policy matters and business realities in the form of an established Dataspeed 40 servich which would hinder the Commission in fashioning the most appropriate mode for carrier offering of competitive data terminal equipment will not have developed.[1]

Conclusion

CBEMA has demonstrated above that two independent conclusions underlie the Bureau's rejection of AT&T's tariff for the Dataspeed 40. The Bureau found that the Dataspeed 40 items were data processing terminals which function as an integral part of a customer's computer system, and AT&T does not dispute the basis for this conclusion. The Bureau found further that the supporting material submitted with the tariff was inadequate to disprove the serious questions of cross-subsidy surrounding this offering, and under established policy the Bureau rejected the tariff for failure to show compliance with the policy against cross-subsidy. Again, AT&T does not dispute that the relevant material to make such a showing is in its hands but not in the record for the Commission to review. On each of these conclusions, the Bureau should be upheld, and affirmance on either ground would be sufficient to uphold the result reached below.

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[1] The Commission's authority to prevent a premature tariff filing for the Dataspeed 40 pending disposition of the policy issues presented is not, of course, limited to the basis discussed in the text of this pleading. For example, the Commission could extend the public notice period under §203(b) of the Communications Act for any tariff filings which seek to offer similar equipment. See, AT&T v. FCC, 503 F.2d 612 (2d Cir. 1974). Also, the Supreme Court has held that a temporary rejection of certain tariff filings pending conclusion of a rulemaking proceeding to determine the controlling framework for the tariffs is fully within a regulatory agency's plenary power. American Commerical Lines v. Louisville & N.R. Co., 392 U.S. 571 (1968). See also, United States v. Storer Broadcasting, 351 U.S. 192 (1956). The notion that a carrier has a "right to file" tariffs which would prematurely resolve a pending rulemaking does not find support in the judicial precedents. AT&T v. FCC (Special Permission), 487 F.2d 864 (2d Cir. 1974), cited by AT&T, held only that tariffs instituting rate increases for an ongoing service could not be prevented by a Commission freeze order. The issue of an order preventing the institution of a new service pending a decision on its lawfulness was not before that court. However, the approach suggested in the text discussion would appear to be more appropriate.

In its effort to overturn the Bureau, however, AT&T urges an anomolous position. While seeking to convince the Commission that novel and momentous issues are at stake which will determine the future of carrier equipment offerings, AT&T then argues that a tariff should be permitted for the very novel and momentous development which the Commission is to investigate. If the Commission should be convinced that further proceedings are necessary to determine the framework for carrier offerings like the Dataspeed 40, then the orderly course of proceeding would be to permit the Bureau decision to remain in force until the underlying policy questions are considered. The Commission has ample authority to so proceed in this matter.

Respectfully submitted,

COMPUTER AND BUSINESS EQUIPMENT
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April 30, 1976

Its Attorneys

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of)
)
AMERICAN TELEPHONE AND) Transmittal No. 12449
TELEGRAPH COMPANY (AT&T))
)
Revisions to Tariffs FCC)
Nos. 260 and 267)

To: The Commission

SUPPORT OF APPLICATION FOR REVIEW AND REQUEST FOR ORAL ARGUMENT IF ORDER OF TARIFF REJECTION IS NOT REVERSED FORTHWITH

The Ad Hoc Telecommunications Committee ("the Committee") by its attorneys, hereby files its Support of Application for Review by American Telephone and Telegraph Company ("AT&T") previously filed herein. The Committee is composed of the communications managers of a group of large telecommunications users that, in each matter addressed, have a specific and vital interest in the subject. For the purpose of this Support, the Committee is composed of the following companies: Bethlehem Steel Corporation, E. I. duPont de Nemours & Company, Ford Motor Company, Monsanto Company, Olin Corporation, Republic Steel Corporation, Union Carbide Corporation, United States Steel Corporation, Westinghouse Electric Corporation, Chrysler Corporation, American Express Company, Exxon, J. C. Penney, and Sears, Roebuck and Co. All of the companies represented utilize extensive in-house communications networks to meet and manage their voice and data communications needs.

1. The Committee has not previously participated in this matter for the reason that it did not and could not reasonably have anticipated the unprecedented action taken by the Chief, Common Carrier Bureau ("the Chief"), when, on March 3, 1976, the offering of Dataspeed 40/4 was stricken from AT&T's Tariffs.

2. The Committee submits that the ordering paragraph of the Memorandum Opinion and Order released March 2, 1976 ("MO&O") in this matter is in error when it states that the offering by AT&T of syncronous data transmission equipment (Dataspeed 40/4) is "patently violative of the Commission's Rules and expressed policies." What is apparent is that the MO&O would extend the Commission's Rules beyond their present meaning and would newly formulate important Commission policy unfavorable to data communications users. More important, the MO&O would immediately deprive data communications users of an existing and valuable competitive choice between data communications terminals designed and provided by the Bell System, compared to others designed and provided by data equipment suppliers; and would establish an improper line of demarcation between communications and data terminal equipment which would have continuing unfavorable effects for communications users. The 40/4 terminal is already in use in intra-state service and has proven technical capacity as a data communications terminal.

POLICY ERROR

3. The Commission is well aware of the fact that transmission

of data over common carrier switched and private line communication channels is a necessary and growing service. The prediction of a former president of AT&T that one day the volume of data transmissions will equal the volume of voice transmissions over the telephone network is a reasonable one. Therefore these Companies have a significant interest in the widest possible availability of both data transmission channels and data transmission terminal equipment on a competitive basis.

4. It is out-of-step with basic Commission policy (to encourage competition in common carrier communications) for the Chief to interpret and extend the Computer Inquiry rules (Docket No. 16979) to prevent common carrier communications companies from furnishing data communications terminals. To do so is to reduce, not to encourage, competition. To do so is to grant to the petitioners-to-reject the AT&T tariff (IBM and two computer industry trade associations) a monopoly in the future data communications terminal equipment market. Such action is not in conformity with Commission policy -- nor compatible with the public interest.

5. This Committee has strongly supported and continues to support the Commission in its efforts to permit interconnection of customer-owned voice terminal equipment -- but it would not have done so if that program had included a proposal that telephone companies could no longer provide improved types of voice terminal equipment when they become available.

6. This Committee strongly supported and continues to support this Commission in its efforts to permit Specialized Common Carriers ("SCCs") to provide private line channels between major cities -- but it would not

have done so if that program had included a proposal that, once SCC channels were available, AT&T would no longer be permitted to put into practice evolutionary improvements in intercity service which become practicable.

7. In summary of this outline of the Committee's support for the Commission's actions to promote competition in the interstate communications business, it should be recognized that the user and public support of these Commission policies are premised upon the assumption that AT&T will be permitted to play an aggressive role as one of the competitors. Without that assurance, which the Chief's action in rejecting the Dataspeed 40/4 tariff places in question, the Commission's actions to promote competition lose much of their attractiveness to users.

PROCEDURAL ERROR

8. The Chief concludes (MO&O, para. 23) that the tariff for the model 40/4 Dataspeed 40 terminal is "patently violative of the Commission's Rules and expressed policies." This conclusion is supported, if at all, by the reasoning set forth in paragraphs 11 through 18. It is submitted that the MO&O discussion lays bare the truth -- that the decision to reject the tariff is tenuous and questionable as to Commission Computer Inquiry "policies" and is in error as to Computer Inquiry Rules.

9. The rejection is based, at least in important part, on a finding by the Chief that "[T]he costs associated with its design, development and manufacture, as submitted with this tariff filing, are not clearly separable from monopoly and other regulated common carrier activities."

The Committee reads this to be either (1) an indication that the Chief is not convinced the rates proposed are proper or (2) a general indication of support for the proposal of the Department of Justice Anti-Trust Division that the design, development and manufacturing activities of AT&T should be separated from those of providing regulated communications services to the public. In either event, or in both, no procedural justification for rejection of the tariff arises. If the Chief wishes to question the AT&T cost justification for the Dataspeed 40/4 rate, he should follow the normal statutory procedures without resorting to the extraordinary action of rejection. If the Chief wishes to support the stated objectives of the ongoing antitrust suit against AT&T, he should do so by appropriate means, not by rejecting improved data communications terminal equipment service offerings on the grounds that the AT&T remains at this time an integrated design, manufacture and service organization.

TECHNICAL ERROR

10. The conclusion that the improved Dataspeed 40 terminal (Dataspeed 40/4) is data processing equipment rather than communications equipment is also in error, as is shown on the face of the MO&O. The Chief did not find that the 40/4 was capable of performing data processing by itself. He merely found that the 40/4 was not capable of performing ordinary telegraph transmission by itself. Nowhere, up to this time, has the Commission previously suggested that a data communications terminal must also be capable of transmitting voice or telegraph to be considered

communications equipment. It is true, of course, that most computers were originally and are still designed to be host to data transmitted by voice frequencies and by conventional telegraph (teletype). Therefore, conventional voice and telegraph communications terminals have been and are widely used to communicate with computers. But to hold that unless a data communications terminal also has the capability of transmitting conventional telegraph signals, it is not a communications terminal, and cannot be offered by AT&T is tantamount to saying that in the future AT&T may furnish channels only, but no terminals. But users have a right to expect special data communications terminals. Indeed, such equipment is the wave of the future.

11. The Chief found the 40/4 to be data processing equipment, rather than communications equipment. But the 40/4 is not a data processor nor capable of performing any independent, economically viable operations without communication channel connection to a computer to which it sends data, as is shown by the Chief's own language:

> A Dataspeed 40/4 [data communications] terminal would not be used to communicate with another 40/4 terminal, and it does not even appear to be capable of such communication without the use of data processing equipment external to the terminals. (MO&O, para. 16)
>
> None of the uses which AT&T has identified in its marketing data for the . . . [40/4] relate to terminal-to-terminal record communication: rather, they relate to the entry and retrieval of data from computers. (MO&O, para. 17)

What the offering of Dataspeed 40/4 terminal equipment by AT&T shows, and what the Chief should have recognized, is that the Commission's policies on permissive interconnection of customer-owned data communications terminal equipment have been successful. The Dataspeed 40/4 offering constitutes a marked advance in technology, and is extremely useful and economical for data communications customers. AT&T has been spurred to design, develop, manufacture and market a type of data communications terminal which is not burdened by features which are not needed for data communications -- the 40/4 will not function as an ordinary telegraph (teletype) terminal. Its functions "relate [only] to the entry and retrieval of data from computers" over communication channels of any length. This is a very favorable development for data communications users. Rejection of the tariff by the Chief negates one of the more significant results of the Commission's interconnection policies by removing the Bell System spur to its competitors in the transmission terminal equipment field -- a result never intended or suggested by the Commission. The Chief's action should be reversed by the Commission forthwith.

LONG RANGE PUBLIC INTEREST CONSIDERATIONS

12. It is clear that data communications are growing in volume and significance. It is clear that data communications terminals can be designed to be more efficient, useful and economical if they are not burdened by multi-purpose requirements, such as the need also to transmit voice or telegraph signals. It is clear that the Dataspeed 40/4 is an AT&T competitive response to data communications terminals being offered by non-communications companies, such as IBM. It is clear that users will

benefit from competition between IBM and AT&T in the data communications terminal equipment market. It is clear that specialized terminals are and will continue to be justified in the evolution of data communications methods. It would therefore be contrary to the interests of the user public to permit the Chief's rejection of the Dataspeed 40/4 tariff to stand unreversed.

13. The Committee suggests that the rejected tariff be accepted forthwith and that, if considered necessary, the Commission reopen Docket No. 16979 or open a new docket to reconsider the matter of data transmission and to better define the proper line of demarcation between data communications terminals and data processing terminals. In no event is the present theory of the MO&O fair and reasonable and in the public interest. To hold that a data communications terminal is a data processor unless it also can be used for conventional slow-speed telegraph operations would be reactionary and counter-productive with respect to the competitive climate in the equipment supply business which the Commission sought to bring about by its Computer Inquiry conclusions and orders.

14. The Committee believes that the Commission should conclude at this time and without reopening Docket 16979 that Dataspeed 40/4 performs a communications service. If a piece of equipment claimed to be a data communications terminal has no remotely-practical economic usefulness standing alone or used only with similar terminals, but is economically viable as a remote computer input-output device and relies for all of its useful operations upon communications channel connection to a host computer, it properly

meets the definition of a data communications terminal. The fact that the terminal may have some local memory for format, to reduce the volume of transmission requirements, or the fact that the terminal may not be useful for voice or conventional telegraph transmissions should not prevent the terminal from falling within the data communications terminal definition.

WHEREFORE, the Ad Hoc Telecommunications Committee respectfully requests the Commission to accept the AT&T tariff filing for Dataspeed 40/4 terminals forthwith; or in the alternative, that the Commission set the matter for oral argument.

Respectfully submitted,

Ad Hoc Telecommunications Committee

By Jeremiah Courtney
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April 30, 1976

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

May 5, 1976

IN REPLY REFER TO:
9500

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In re: AT&T Transmittal No. 12449

Dear Mr. Anderson:

This is in response to your letter of February 11, 1976 inquiring as to the status of AT&T Transmittal No. 12449 (the DATASPEED 40 matter) under the Commission's ex parte rules. Specifically, you ask whether the filing of petitions to reject or suspend the AT&T tariff filing and various opposition pleadings by AT&T brings this matter within the meaning of Section 1.1207 which states that rulemaking proceedings "conducted pursuant to Section 204 of the Communications Act are restricted" (i.e., subject to the ex parte rules) "from the day they are instituted . . ."

Ordinarily, rate making and other tariff proceedings which are designated for hearing under Section 204 of the Act are "restricted" from the date of the Commission's designation order instituting the proceeding. In this case, of course, the Recommended Decision of the Chief, Common Carrier Bureau rejected the tariff without resort to formal hearing procedures. This action was based on the view that the tariff on its face, considered in the light of the various pleadings, was violative of the Commission's rules and policies adopted in the Computer Inquiry (28 FCC 2d 291; 28 FCC 2d 267), and that there was no material issue of fact requiring evidentiary hearing. AT&T has sought Commission review of the Recommended Decision and opposition pleadings are anticipated. In this posture we believe that the DATASPEED 40 matter, though perhaps not technically covered by Section 1.1207 of the rules, presently falls within the spirit of the prohibition against ex parte communications.

Sincerely,

for Joseph A. Marino
Walter R. Hinchman
Chief, Common Carrier Bureau

cc: William V. Catucci, Esq.
American Telephone & Telegraph Co.

Joseph M. Kittner, Esq.
McKenna, Wilkinson & Kittner

Terry G. Mahn, Esq.
Computer Industry Association

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

May 7, 1976

IN REPLY REFER TO:

9500

William V. Cattucci, Esq.
AT&T Long Lines
32 Avenue of the Americas
New York, New York 10013

Re: Dataspeed 40 Materials

Dear Mr. Cattucci:

The Common Carrier Bureau has materials supplied by AT&T in response to our request for additional information with respect to AT&T's tariff filing for the Dataspeed 40, AT&T Transmittal 12449, to amend AT&T Tariffs FCC Nos. 260 and 267.

At the time the material was submitted AT&T informally indicated that in its view some of the material might be considered as confidential information within the meaning of Sub Part C 0.457 and 0.459 of our Rules.

Part 0.459 provides that any person who wishes to keep information submitted at the request of the Commission from public disclosure may do so by submitting a written request specifying the materials and stating the reasons for withholding the materials from public inspection. The purpose of this letter is to inform you that a written request to withhold Dataspeed 40 materials from public inspection must be received by the Common Carrier Bureau not later than May 17, 1976, otherwise all Dataspeed 40 material will be placed in the public file.

Sincerely,

Edward R. DeVaughn

cc: R. Reel - Chief, Tariffs & Services Division
C. Carrington - AT&T, 195 Broadway
L. Feldner - FCC

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of AMERICAN TELEPHONE AND TELEGRAPH COMPANY, LONG LINES DEPARTMENT AT&T Transmittal No. 12449, November 18, 1975 Revisions to Tariff F.C.C. Nos. 260 and 267.	)	Transmittal No. 12449

REPLY

American Telephone and Telegraph Company ("AT&T"), pursuant to Section 1.115(d) of the Commission's Rules, hereby replies to the Opposition dated April 30, 1976 filed by International Business Machines Corporation ("IBM") and the Response dated April 30, 1976 filed by the Computer and Business Equipment Manufacturers Association ("CBEMA") which oppose AT&T's Application for Review of the Order of the Chief of the Common Carrier Bureau* rejecting AT&T's most recent tariff revisions to Dataspeed 40 service.**

1. This proceeding involves the rejection of AT&T's Dataspeed 40 tariff revisions (termed Dataspeed 40/4) by the Chief of the Common Carrier Bureau assertedly because it constitutes an offering of data processing and not data communications service. The Chief reached this conclusion because the

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* Memorandum Opinion and Order, released March 3, 1976 (Mimeo No. 61760)

** Dataspeed is a registered trademark of AT&T. Dataspeed service is presently offered by AT&T and the Bell System companies pursuant to effective interstate and intrastate tariffs.

offering falls within an alleged class of equipment whose primary function, design and marketing is to interact with a customer's central computer.

2. In its Application for Review, AT&T showed that within the terms of the Communications Act and under the definitions presently contained in the Commission's Rules, Dataspeed 40/4 is a communications service and not data processing. This is because the function performed by Dataspeed 40/4 service is the entry, transmission and delivery of messages, the informational contents of which are under the control of the customer and wherein such contents of the messages remain unaltered by the carrier. Moreover, it was shown that the Dataspeed 40/4 offering is simply a technologically updated version of teletypewriter service which has been offered under tariff for more than 40 years by AT&T and other carriers and which it cannot be seriously disputed constitutes a communications service. Under these circumstances, there is no lawful basis for rejecting the Dataspeed 40/4 tariffs; further, the Chief's rejection of the tariff on substantive grounds as announced in the Order was contrary to the statutory plan of the Communications Act. AT&T took the position that if, in the Commission's view, there were any open questions of decisional importance, the tariff should be permitted to go into effect pending Commission resolution of such questions.

3. AT&T stressed in its Application that review by the Commission was warranted because the Chief's novel and

unsupported definition of data processing would have a far-reaching impact on the role to be played by carriers in the provision of services to data communications users. The effect of the Order would be that if a data terminal provides a service which transmits messages to a location where they are received by an operator who transfers the information to the customer's computer, then it is a communications service which AT&T and other carriers may provide under tariff. But if the service provided by the terminal performs precisely the same functions except that the customer wishes to make his service more efficient by utilizing modern technology so that the terminal can communicate directly with the computer, then under the Chief's definition the carrier would be offering a data processing service and under the Commission's Rules AT&T would be precluded from providing the service. A ruling with such far-reaching consequences, we urged, should not be made on the basis of delegated authority, but should receive plenary consideration by the Commission.

4. IBM and CBEMA agree with AT&T that the matters involved in the Chief's rejection of AT&T's Dataspeed 40/4 tariff are of such importance as to warrant this Commission's immediate review. In this regard CBEMA stated that Commission review is " . . . appropriate and will serve to settle areas of uncertainty regarding equipment like the Dataspeed 40. . . ." (Response, p. 2.)* The Ad Hoc Telecommunications Committee (Ad Hoc)

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* It is well established law, however, that a tariff may only be rejected if it is demonstrably unlawful on its face and not because of alleged "uncertainties." Associated Press v. FCC, 448 F.2d 1095 (D.C. Cir. 1971); Municipal Light Bds., et al. v. FPC, 450 F.2d 1341 (D.C. Cir. 1971). CBEMA also requests a de novo review by the Commission. But, since the rejection of a tariff is involved here, the Commission must first determine

(Cont'd)

representing the views of 14 large business customers, United States Independent Telephone Association (USITA) and GTE Service Corporation (GTE) all filed comments in support of AT&T's Application for Review. These parties pointed out the significance of the Chief's action from the point of view of both other common carriers and users of communications services. Thus, Ad Hoc stated that the Chief's Order " . . . would extend the Commission's Rules beyond their present meaning and would newly formulate important Commission policy unfavorable to data communications users" in that it would "deprive data communications users of an existing and valuable competitive choice. . . ." (Support of Application, p. 2.)* In addition, Ad Hoc, USITA and GTE all supported the position of AT&T that the Dataspeed 40/4 service constitutes communications and that the Chief was in error in rejecting the tariff. There is clear agreement that the Commission should review the Chief's action. As a practical matter, the issue before the Commission on such review is whether AT&T may offer the Dataspeed 40/4 service.

5. The oppositions filed by IBM and CBEMA do not point to any valid reasons why the Commission should not permit

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(Cont'd.)

whether or not rejection is appropriate and, if as AT&T believes, there is no lawful basis for rejection, the tariff must be permitted to go into effect pending any proceeding the Commission may desire to undertake.

* It should be pointed out that the views of Ad Hoc indicate that the terminals with which Dataspeed 40/4 terminals compete are in fact widely considered to be data communications terminals. This is in direct conflict with the opinion expressed in the Order and cited by IBM at page 10 of its Opposition, that none of these terminals had been alleged to be communications devices. See also AT&T's Application for Review, n. at 21, which showed that IBM itself has described its 3270 terminal as a communications terminal.

the Dataspeed 40/4 tariff to be permitted to become effective forthwith. They ignore controlling portions of the Commission's Rules and base their arguments on extraneous matters which are unrelated to the functions actually performed by AT&T's Dataspeed 40/4 offering.

6. Stated syllogistically, IBM's principal argument is as follows:

Major Premise: Computers are used for data processing.

Minor Premise: Dataspeed 40/4 service is used to communicate with ("input") computers.

Conclusion: Dataspeed 40/4 constitutes data processing.

The above "conclusion" is clearly a non sequitur and the invalidity of the argument is obvious on its face. It would lead to the plainly erroneous conclusion that when a telephone set, or data set or any other kind of terminal equipment is used with a customer's computer, the service provided by the furnishing of this equipment would then constitute the offering of data processing service.* Thus, as more and more uses are found for the computer, this in and of itself would circumscribe the ambit of common carrier communications services. As we have pointed out in our Application, IBM's position is inconsistent with the provisions of the Communications Act and the Commission's Rules.

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* Indeed, since under IBM's view, the function of the carrier's equipment is not a pertinent factor there would be no reason not to also include wire and microwave facilities within the definition of data processing, since they too are used with customers' data processing computers. Such a reductio ad absurdum extension of the IBM position points up its speciousness.

7. Under Section 64.702(a)(1) of the Commission's rules, data processing is defined as the:

> " . . . use of a computer for the processing of information as distinguished from circuit or message switching. 'Processing' involves the use of the computer for operations which include, inter alia, the functions of storing, retrieving, sorting, merging, and calculating data, according to programed instructions." (Emphasis supplied.)

The Dataspeed 40/4 terminal does not perform data processing as defined by the Rule. It is significant that the parties and the Bureau Chief do not dispute this. Moreover, the Commission's definition of message switching provides a basis on which to determine what is not data processing. Section 64.702(a)(2) of the Rules describes message switching, a communications function, as the " . . . computer controlled transmission of messages, between two or more points, via communications facilities wherein the content of the message remains unaltered." (Emphasis supplied.) Thus, under the Commission's Rules the distinction between data communications and data processing turns on the question of whether the content of the message remains unaltered. Since the content of the message transmitted by the customer is unaltered by the Dataspeed 40/4 terminal, the service provided by this terminal is not data processing but rather communications service.

8. It is apparent that IBM has misinterpreted AT&T's position in this regard. IBM incorrectly asserts that the characteristic of the message remaining unaltered is " . . . a characteristic AT&T attributes only to message-switching devices. . . ." (Opposition, p. 13.) To the contrary, this

characteristic is one that is shared in common by all communications services and equipment including telephone sets and transmission facilities and is a hallmark of those services. In fact, the Dataspeed 40/4 does not perform message-switching. Nonetheless the basic message alteration principle still applies and unmistakably identifies the service as a communications service.

9. Rather than consult the Commission's definition of data processing, IBM seeks to treat Dataspeed 40/4 as a hybrid service which should be evaluated on a case-by-case basis to determine whether the so-called "primary purpose" of this offering is data communications or data processing. Dataspeed 40/4, however, is not a hybrid offering. A hybrid offering is one in which the carrier provides both data processing and message switching service in a single integrated service offering. (Commission Rules § 64.702(a)(5)). To determine whether a carrier's offering includes both data processing and message switching, it is necessary to refer to the definitions set forth in Section 64.702 of the Commission's Rules. Since under these rules Dataspeed 40/4 service performs neither message switching nor data processing no hybrid service is involved and IBM's so-called "primary purpose" test is not relevant. To the extent that IBM suggests that services may be classified on a case-by-case basis without regard to the definitions contained in the Commission's Rules, its argument must of course be rejected.

10. CBEMA argues that the Chief has based his Order rejecting the Dataspeed 40/4 tariffs on two independent grounds: first, that the service constitutes an offering of data processing; and second, because compliance with the Commission's policies against cross-subsidy had not been demonstrated. However, CBEMA concedes that " . . . the Bureau's terse conclusion in ¶ 22 of the Order that Section 61 of the Commission's Rules was not violated by AT&T reflected the apparent determination that the matter had been disposed of on other grounds. . ." (Response, p. 17, n. 2) Since there was no finding of cross-subsidy, CBEMA is clearly incorrect in asserting that a failure to disprove the existence of cross-subsidy constituted an independent basis for the Order. On the contrary, the Chief expressly held that AT&T's cost justification had satisfied the requirements of Section 61.38 of the Rules. As AT&T pointed out in its Opposition to CBEMA's Petition for Limited Review, the crux of the issue before the Commission is whether or not AT&T's Dataspeed 40/4 offering is data processing or communications service. If it is the former AT&T may not offer it. If it is the latter the Chief has held that the cost justification submitted with the tariff filing meets the requirements of Part 61.

11. In reality, what CBEMA is attempting to do is to use the alleged existence of cross-subsidies to define what is or is not data processing and consequently what may or may not be provided by AT&T. However, as has been previously stated, this determination may only be made on the basis of the definitions

contained in the Commission's Rules. Once it is thus determined that a carrier's offering is data processing then the Commission has ruled that to avoid even the possibility of cross-subsidy a carrier must provide such services through a separate subsidiary in order to achieve "maximum separation" of this service from the carrier's communication services. The question of whether a service is properly priced is one that the Commission must consider under Sections 201-205 of the Act, and it has ample jurisdiction thereunder to inquire into and eliminate any cross-subsidies. But the question of whether subsidies exist cannot determine the character of the service.*

12. CBEMA's arguments regarding possible cross-subsidies really go to the appropriateness of the rate levels established for the service and issues of this type cannot provide the basis for *rejecting* a tariff.** At most, these issues may be the subject of an investigation under Section 204 of the Act.

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* In point of fact, the cost justification submitted by AT&T with the tariff filing showed that for the first three years the projected revenues for Dataspeed 40/4 service would exceed the relevant costs of that service by $4.9 million, an excess of revenues over costs of 15.5%. Thus, it was shown that Dataspeed 40/4 is expected to make a contribution toward meeting the common costs of the company and benefit the users of other services including MTS users (AT&T Opposition to CBEMA Petition for Limited Review, p. 7). Further, as AT&T has explained, questions of subsidy are not pertinent because all costs associated with the development and manufacture of this terminal are completely segregated from any monopoly services of the Bell System. (See AT&T's Application for Review, p. 19, n.)

** See, AT&T v. FCC 487 F.2d 865 (2nd Cir. 1973); United States v. S.C.R.A.P., 412 U.S. 669, 697 (1973); North Carolina Natural Gas Corp. v. United States, 200 F. Supp. 745, 750 (D. Del. 1961); Rardin Grain Co. v. Illinois Central R.R., 288 F. Supp. 813 (S.D. Ill. 1968).

13. Several parties have requested oral argument on this matter. We believe that the issues herein are clear cut and overwhelmingly dictate reversal of the Chief's action. Nevertheless, if the Commission believes that argument would be of help and would not unduly delay the effectiveness of the tariff, AT&T does not oppose these requests.

14. The effectiveness of the Dataspeed 40/4 tariff has been delayed now for almost 5 months and during this time the using public has been denied this service. As the comments filed by the Ad Hoc Telecommunications Committee state, the Chief's Order " . . . deprive[s] data communications users of an existing and valuable competitive choice between data communications terminals designed and provided by the Bell System, compared to others designed and provided by data equipment suppliers . . ." (Support of Application, p. 2). For the reasons set out above and in AT&T's Application for Review and its Opposition to CBEMA's Petition for Limited Review, the Commission should grant AT&T's Application and permit the Dataspeed 40/4 tariff to go into effect forthwith.

Respectfully submitted,
AMERICAN TELEPHONE AND TELEGRAPH COMPANY

By /s/ Bennett Feigenbaum
Bennett Feigenbaum

By /s/ William V. Catucci
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May 13, 1976

BEFORE THE

Federal Communications Commission

WASHINGTON, D. C. 20554

In the Matter of	)	
	)	
AMERICAN TELEPHONE AND TELEGRAPH COMPANY (AT&T)	))	Transmittal No. 12449
	)	
Revision to Tariffs FCC Nos. 260 and 267 (Dataspeed 40 Service)	)))	

To: The Commission

REPLY TO OPPOSITION

The Computer and Business Equipment Manufacturers Association (CBEMA), by its attorneys, replies herein to the Opposition of AT&T to CBEMA's Petition for Limited Review in the above-referenced matter.[1]

Preliminary Statement

CBEMA's Petition for Limited Review challenged one aspect of the *Memorandum Opinion and Order* of the Chief, Common Carrier Bureau[2] which rejected the tariffs filed by the Bell System for the Dataspeed 40/4 computer terminal equipment. As its two primary holdings, the Bureau's *Order* found the Dataspeed 40 equipment to be an integral part of a customer's data processing system, and thus its offering under tariff by the Bell System contravened the Commission's *Computer Inquiry* Rules.[3]

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[1] Petition for Limited Review, April 2, 1976.

CBEMA is participating in this matter through its Telecommunication Committee which includes the following members: Addressograph Multigraph Corporation; Burroughs Corporation; Control Data Corporation; Dictaphone Corporation; General Electric Company; Hewlett-Packard Company; Honeywell Information System, Inc.; IBM Corporation; Monroe, The Calculator Company; NCR Corporation; Olivetti Corporation of America; Sanders Associates, Inc.; Sperry/UNIVAC; Tektronix, Inc.; Xerox Corporation and 3M Company.

[2] Mimeo 61760, released March 3, 1976 (hereinafter cited as "*Order*").

[3] *Order*, paras. 15-19, citing In the Matter of Regulatory and Policy Problems Presented by the Interdependence of Computers and Communications Services and Facilities, 28 F.C.C.2d 267 (1971) (hereinafter "*Computer Inquiry*"). *See also*, §64.702 of the Commission's Rules, prohibiting AT&T from offering data processing.

In addition, the *Order* found that the Dataspeed 40 tariff was inconsistent with the *Computer Inquiry* policies in that the "material submitted does not permit us to determine whether its development costs are subsidized, as the Commission in the *Computer Inquiry* contemplated could occur."[1]

CBEMA supports the result reached by the Bureau and the essential rationale of both findings underlying the tariff rejection. In our view, the *Order* applied the appropriate Commission policies, both with respect to data processing offerings and possible cross-subsidization of competitive products, to the computer terminals involved herein.[2] At the same time, CBEMA has objected to the *Order's* conclusions on a material issue raised by CBEMA, the adequacy of the cost information to support the tariff on a threshold or *prima facie* level. Because of its strong support for the *Order's* result, however, CBEMA requested treatment of its Petition on a contingency basis, for a disposition following review of AT&T's Petition to overturn the *Order's* rejection of its tariff.

The Bureau's Order Did Not Rule Adequately On The Deficiencies in AT&T's Cost Information as Raised by CBEMA

CBEMA raised below strenuous objections to the Dataspeed 40 tariff filing[3] because the cost information submitted with it, particularly for the design, manufacture, marketing and tariffing of the equipment, was inadequate for even a threshold review of the rates as required by §61.38 of the Commission's Rules.[4]

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[1] *Id.* at para. 20.

[2] CBEMA's strong support for the *Order's* result and essential rationale was expressed also in its Opposition to AT&T's Petition for review, filed April 30, 1976.

[3] It should be emphasized that at *no* time has CBEMA questioned the rates for the Dataspeed 40 items *per se*. It is our position that no such rate inquiry can even be considered until adequate cost information is submitted.

[4] As promulgated in *Tariffs - Evidence,* Section 61.38(a) requires the submission of information describing "the basis of ratemaking employed" which includes a detailed statement of the design, development, and maintenance costs of a new product when serious questions of cross-subsidy are raised concerning it. See *infra*, p. 6-7; 25 F.C.C.2d 957, 965; 40 F.C.C.2d 149, 153 (1973).

To support this objection, a detailed analysis was submitted of the development of a new product by the Bell System, showing the necessity for identification of costs by Bell System organization and fund at key steps in the development process. That is, the interplay of offices and funds from AT&T, Bell Telephone Laboratories, Western Electric Company, and Teletype Corporation in the development of a new product is such that monopoly service revenues could be supporting this competitive product at *numerous* stages between its initial concept and the tariff filed for it.[1] Despite this thorough review by CBEMA and the patent failure of AT&T to submit the cost information described,[2] the Bureau denied CBEMA's claims in this brief paragraph:

> Finally, CBEMA contends that the cost justification submitted is insufficient and violates Section 61.38 of the Rules. Since AT&T has submitted additional material at our request to support statements made in its original filing, we consider the material not violative of Part 61 of our Rules.

In contesting the Bureau's disposition of CBEMA's cost arguments, CBEMA raised three main points which demonstrated the inadequacy of the Bureau's Paragraph 22, the *Order's* sole treatment of cross-subsidy questions aside from the *Computer Inquiry* context:[3]

-- Paragraph 22 was inconsistent with Paragraphs 19 and 20 which found that the material submitted was not sufficient to determine "whether its [Dataspeed 40's] development costs are subsidized";

-- Paragraph 22 was inadequate as a matter of law in its failure to discuss and rule clearly on the cost material submitted in light of the requirements of §61.38 of the Rules; and

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[1] Petition for Limited Review, Appendix B; Petition for Relief, December 15, 1975, p. 8-13; Reply to Opposition, January 19, 1976, p. 8-13.

[2] AT&T submitted cost and revenue data with its original filing which attempted to track the manufacturing and *future* costs of the Dataspeed 40 items. At no time, *however*, has AT&T submitted the full information regarding the costs incurred *before* the equipment was tariffed, including costs of design, development, marketing and tariffing.

[3] While we agree that the *Computer Inquiry* is clearly controlling precedent in this matter, we have repeatedly made clear that the cross-subsidy questions exist *apart* from questions of compliance with the *Computer Inquiry*. Petition for Relief, p. 10-12.

-- Paragraph 22 ruled against the weight of the evidence as a matter of law. 1/

In support of its Petition, CBEMA outlined the standards for valid agency action under the Administrative Procedure Act and judicial precedents 2/ and reviewed the cost evidence in the record in light of the questions raised by CBEMA and the Bureau regarding the design and development cost information needed to support the tariff as a prima facie matter. 3/ From this review, it was clear that the original material submitted by AT&T did not contain the needed development cost information, and the letter of William V. Catucci of March 26, 1976, confirmed that no additional cost information had been submitted by the Bell System to support any of the statements in its original filing. 4/ As a result, CBEMA showed that the conclusions of Paragraph 22 rested upon an incorrect factual assumption which completely undermined their legal validity.

The basic point involved in CBEMA's Petition for Limited Review goes to the substance of §61.38 as much as to the validity of Paragraph 22, however. CBEMA has contended from the beginning of this litigation that §61.38 requires the full cost information necessary to review a proposed tariff rate. Where a competitive service is involved, the Commission has found such full information to be "particularly important":

1/ Petition for Limited Review, p.12-15. In view of these deficiencies, Para. 22 clearly violated the standard set by §557 of the Adminsitrative Procedure Act governing initial agency decisions:

> All decisions, including initial, recommended, and tentative decisions, are a part of the record and shall include a statement of --
>
> (A) findings and conclusions, and the reasons or basis therefor, on all the material issues of fact, law, or discretion presented on the record;

That the Bureau regards the Order as a recommended decision is clear from the letter of Walter Hinchman to David R. Anderson, counsel for IBM, May 5, 1976.

2/ The requirements of internal consistency, clarity of expression and support of substantial evidence are laid out in §§ 553, 554, and 557 of the Administrative Procedure Act and in the leading cases of ICC v. Louisville & Nashville R.R., 227 U.S. 88, 91-94 (1913); Nader v. FCC, 520 F.2d 182 (D.C. Cir. 1975).

3/ Petition for Limited Review at 9-11.

4/ Letter of William V. Catucci, Attorney, AT&T Long Lines Dept. to Joseph M. Kittner, March 26, 1976.

> Thus, the purpose and effect of our rules in this regard is not to impose new burdens of proof on carriers but is to provide us with information by which, in the reasonable exercise of our discretion, we can determine the orderly and proper procedures to follow in the solution of the difficult and complex problems increasingly presented in tariffs filed with us by the carriers. In short, the purpose of the rules is to elicit information and data which will facilitate the Commission's judgment as to whether such proposed tariffs present questions of lawfulness which warrant our investigation and hearing.
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> * * *
>
> ... We have found that it is particularly important to obtain the data required by our rules where questions are raised as to whether a new or reduced rate competitive service is being cross-subsidized by other services and whether there is factual support for allegations of anti-competitive impact from such rates.

40 F.C.C.2d 152-53. Further, in the case of a competitive product involving new technology and extensive development efforts, there should be no question that design, development, tariffing and marketing costs should be specifically allocated to that product in such fashion that an initial review can be made by the Commission's staff before the tariff goes into effect. The stated purpose of §61.38 is to elicit this crucial information,[1/] and the Commission should hold in this case that development costs are essential to a threshold showing under §61.38.

AT&T's Opposition Does Not Refute the Inadequacies of Paragraph 22 or the Need for Information on the Design and Development of the Dataspeed 40 Items

In its Opposition, AT&T contested the basic point raised by CBEMA, the adequacy of its initial cost information filing as the *prima facie* showing required by §61.38 of the Commission's

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[1/] Compare 25 F.C.C.2d at 961, 965.

> This proposed rule was intended to provide the Commission and the staff with the information necessary to evaluate tariff filings. ...
> In any event, we regard the information with respect to revenue-cost relationships as basic to the formulation of the essential regulatory judgments we must make with respect to the lawfulness under the Communications Act of new or revised rates tendered by common carriers.

Rules[1] and the consistency of Paragraph 22 with other conclusions in the Order. That is, AT&T contended that the rates proposed would yield revenues sufficient to "exceed the relevant costs of that service by $4.9 million, an excess of revenues over costs of 15.5%" which showed that "CBEMA's concerns about cross-subsidies flowing from AT&T's monopoly services are unfounded."[2] Solely on this showing that future revenues would exceed the "relevant" costs -- as determined by AT&T -- AT&T asserts that a prima facie case has been made to permit acceptance of its tariff.[3]

Upon a close reading of the Opposition's discussion of "relevant" costs, however, certain vital points have been left undisputed by AT&T. First, CBEMA made clear that the focus of contention in this case is not the rates or revenues assigned the Dataspeed 40 but precisely the components of the "relevant" costs which the rates are to cover. AT&T admitted that the design and development costs are the real issue herein and further it admitted that it has not submitted the full information regarding them, although such information seems to be readily available:

> "CBEMA's stated concerns regarding possible cross-subsidy of the design, development and manufacturing costs of Dataspeed 40/4 are without any factual basis since Dataspeed 40 terminals are manufactured by Teletype Corporation, a completely separate subsidiary and all design, development and manufacturing costs of this equipment are completely segregated from all other Bell

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[1] The authorities cited by AT&T and CBEMA agree that a two-step review of tariffs is contemplated by Part 61 of the Rules. First, a sufficient showing must be made as an initial or threshold matter in order to have a tariff accepted for filing. Second, any remaining questions as to the rates based on the initial showing are to be settled under the suspension and hearing provisions of Section 204 of the Communications Act. See AT&T-Telpak, 33 F.C.C.2d 522, 523 (1972).

In this case the dispute centers over the threshold judgment whether the cost information is sufficient to permit acceptance for filing. Naturally, CBEMA can make no argument as to the lawfulness of the actual rates until the necessary explanatory cost material is submitted.

[2] Opposition, p. 7 (emphasis added).

[3] In addition, AT&T reiterated the assertion made below that the material submitted was similar to material filed with other tariffs which had been accepted by the Commission. No details as to the tariffs or the nature of the cost materials were given to support this assertion. Id. at 6.

> System costs." See AT&T's Application for Review, footnote at p. 19.[1]

Second, AT&T does not maintain that these key items of design and development costs are irrelevant or superfluous to the showing required under Section 61.38: rather, the company appears to argue that the "relevant costs" are only those which begin with manufacture and in any case are a matter for unilateral determination by AT&T. Thus, no real defense has been submitted to CBEMA's basic objection to the tariff, that the design and development costs are crucial to judging cross-subsidy of this competitive service and that this crucial information has not been submitted in *any* form, a clear violation of Section 61.38 of the Commission's Rules.

Finally, AT&T asserted that cross-subsidy in the context of the *Computer Inquiry* was a different matter from cross-subsidy in the context of a multi-service common carrier. Thus Paragraph 22 was construed by AT&T to be an alternative holding of the Bureau that "if the same service [Dataspeed 40] is a communications service, the cost jusitification submitted is sufficient to shown [sic] that all relevant costs will be recovered through the proposed rates and that cost information which was supplied meets the requirements of Part 61 of the rules."[2]

In contrast to this theory, however, the express language of Paragraph 22 conveys no sense that it is an alternative holding on the communications nature of the equipment at issue. Rather, the Order expresses no doubts that the Dataspeed 40 items are data processing terminals.[3]

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[1] Opposition at 6, footnote */. Despite the apparent availability of the design, development and manufacturing costs, AT&T did not submit them. By its admission, then no relevant "additional material" was supplied to satisfy Part 61 of the Rules or support the Bureau's ruling in Paragraph 22, which now stands devoid of factual support.

[2] Opposition, p. 5.

[3] *Order*, para. 15.

It is more likely that Paragraph 22 reflects an afterthought on the part of the Bureau, apparently in the belief that the rest of the Order disposed of all outstanding questions. Taking the AT&T argument at face value, however, we will show below that in judging cross-subsidy questions _either_ in the context of the _Computer Inquiry_ _or_ in light of competitive and monopoly communications services, the cost information submitted does not make a _prima facie_ showing to support the tariff proposed.

Under Any Standard of Cross-Subsidy, AT&T's Initial Showing Was Inadequate and a Contrary Ruling Cannot be Sustained.

CBEMA has demonstrated above and in its Petition for Limited Review that Paragraph 22 is totally deficient as a ruling on a contested issue, factually incorrect, and contrary to the evidence before the Bureau. For these reasons, substantially undisputed by AT&T, CBEMA's Petition should be granted if the remainder of the _Order_ is reversed. Further, the Commission should make clear that the cross-subsidy concerns raised by CBEMA are matters for threshold resolution with the material required by §61.38, no matter whether the Dataspeed 40 items are considered data processing or communications equipment.

As AT&T points out and the recent SICOM case confirms,[1] if the Dataspeed 40 items are considered data processing equipment, then complete separation of _all_ costs associated with it must be made in order to prevent any possible cross-subsidies.[2]

A corresponding identification and separation of costs is no less important, however, when a competitive product is tariffed by a firm with such huge monopoly revenue resources.

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[1] In the Matter of Western Union Telegraph Co. Tariff F.C.C. No. 251 (SICOM Service), FCC 76-365, released April 30, 1976.

[2] _Id_. at para. 15:

> This case presents a perfect illustration of the concerns which prompted our _Computer Inquiry_. The data processing services and communications services are offered in such a manner that it is nearly impossible to determine whether any cross-subsidy is flowing from the communications service to the data processing service. For this very reason we prescribed our "maximum separation" rule.

CBEMA has previously pointed out the long history of Commission concern for such cross-subsidy, expressed in Tariffs - Evidence, supra, and most recently in the Recommended Decision in Docket No. 18128, in the Notice of Inquiry in Docket No. 20003, and in the decision in Land Mobile Service in the 900 MHz Band.[1/] The concern over cross-subsidy of a new competitive product has also been expressed by the Massachusetts Department of Public Utilities (DPU) in a case involving the Dimension PBX, a new and sophisticated Bell System product in the voice equipment field comparable to the Dataspeed 40 in the computer terminal field.[2/]

In reviewing the proposed rates for the Dimension PBX before the tariff went into effect, the DPU made clear its concern that the Bell System product did not receive an undue advantage from the fact of the market strength of the Bell companies:

> In the monopoly/competitive dichotomy here presented, the role of regulation is crucial. The prices set for competitive services should not be set so low as to entail cross-subsidization from other classes of service. 3/
>
> The provision of PBX service is a very small part of the Company's total state business. The enormous size of the monopoly exchange and message toll services engulfs the impact of NET's competitive services, including PBX. Because there is substantial incentive for NET to engage in anti-competitive pricing practices, it is crucial for this Department to impose the most rigorous standards of accountability and justification upon NET for its competitive tariff filings, such as Dimension PBX. 4/

As to the specific cost elements discussed in reviewing the Dimension PBX tariff, the DPU put emphasis on one factor identified for scrutine here, the assignment of "all research

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1/ See, respectively, Recommended Decision of the Chief, Common Carrier Bureau, Docket No. 18128, Mimeo 59797, released January 15, 1976; 46 F.C.C.2d at 218 (1974); 51 F.C.C.2d at 251 (1975).

2/ D.P.U. 18403, Investigation by the Department on its own motion as to the propriety of the rates and charges set forth in the following revisions to the tariffs of New England Telephone and Telegraph Company for M.D.P.U. Number 10, April 21, 1976, attached hereto as Appendix A.

3/ Id. at 14.

4/ Id. at 15-16.

and development costs ('R&D') incident to Dimension PBX to the so-called 'customer premise product line':

> This treatment results in an inadequate allocation of the costs when such costs are the basis of pricing a competitive product ... The customer premise product-line to which this R&D is assigned consists largely of basic non-competitive telephone equipment which is located on the customer's premises, e.g., all basic residential telephone handsets. Thus, the residential ratepayer, for instance, is bearing the R&D associated with a sophisticated product such as Dimension PBX, even though there is no correlation between the character or capability of the equipment or the communications needs of the respective subscribers. [1]

Numerous other deficiencies in the accounting of or identification of costs for the Dimension PBX were also noted by the DPU,[2] and considerable revision in the rates was required before the tariff could be put into effect.[3]

Notwithstanding the differences in manufacturing entity between the Dimension PBX and the Dataspeed 40, the DPU decision on the R&D costs incurred for the product stands as substantial confirmation of the fundamental objection to Transmittal No. 12449 urged by CBEMA herein. That is, considerable expense has been incurred by Teletype Corporation, in the manufacture of Dataspeed 40/4, by AT&T in its marketing and tariffing and by some Bell System entity, probably Bell Telephone Laboratories, in its design and development. The essential purpose of §61.38 is to elicit these costs, and that purpose has not be fulfilled here.

Conclusion

CBEMA has shown above that Paragraph 22 is a wholly inadequate excuse for a reasoned agency action on a material issue surrounding the Dataspeed 40 tariff. The ruling of the paragraph is internally inconsistent with the remainder of the Order; contrary to the evidence in the record, and contrary to confirmed Commission policy regarding cross-subsidy. If the Bureau is not upheld on the tariff rejection for the reasons given in the bulk of the Order,

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[1] Id. at 25-26 (emphasis added).

[2] Id. at 27-37.

[3] Id. at 38.

CBEMA respectfully urges that the full information regarding the Dataspeed 40 equipment be required to be submitted for review before any tariff for it goes into effect.

Respectfully submitted,

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May 13, 1976

The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

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April 21, 1976

D.P.U. 18403

Investigation by the Department on its own motion as to the propriety of the rates and charges set forth in the following revisions to the tariffs of the New England Telephone and Telegraph Company for M.D.P.U. Number 10: Supplement Number 114 - Title Page - Original Page 1; Part III, Section 17 - Revision of Pages 1, 2 and 3 - Original pages 23 through 39, and Section 23 - Revision of Page 5. These tariffs were filed with the Department on May 23, 1975 to become effective June 22, 1975.

Appearances: Robert D. Bruce, Esquire and Jeanne S. Conroy, Esquire, for New England Telephone and Telegraph Company.

Cohn and Marks (by Bruce P. Saypol, Esquire, and Edwin B. Spievack, Esquire), and

Weston, Patrick, Willard and Redding (by Thomas P. Arnold, Esquire) for International Business Telephone, Inc. and North American Telephone Association.

On May 23, 1975, New England Telephone and Telegraph Company ("NET" or "the Company") filed with the Department rates and charges for a new customer switching system called Dimension* PBX Service (hereafter identified as "Dimension PBX" or "the service") to become effective June 22, 1975. By order of the Department dated June 12, 1975, these rates and charges were suspended until April 22, 1976.

On July 15, 1975, NET filed its Motion for Reconsideration of the Suspension Order. A prehearing conference was held on August 7, 1975. By Order dated January 2, 1976, the Department scheduled hearings to begin on January 29, 1976.

Intervention was granted to International Business Telephone, Inc. ("IBT") and North American Telephone Association ("NATA"), collectively identified hereafter as the "Intervenors". Hearings were held in this matter on January 29, February 23, 26 and 27, March 1, 2 and 3, 1976.

INTRODUCTION

The Dimension PBX is a new more advanced addition to the product line known as Private Branch Exchanges ("PBX"). It is a considerably more sophisticated system than its predecessors. In fact, it has a new concept in switching design which greatly increases its feature capacity and flexibility through the use of computer programming. The computer is the heart of the system; it may be programmed with instructions to accomplish individualized service customized to the particular customer's communications needs. This is accomplished through computer programming (software) rather than equipment (hardware) and modifications used by earlier PBX systems.

As a result of this advanced technology, much greater flexibility in telephone service features is available. 1/ Also, the Dimension

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1/ New PBX features available with Dimension PBX are inter alia, call waiting, distinctive ringing, automatic call back, outgoing trunk queueing and self diagnosis. The use of time division switching is unique to Dimension PBX among NET PBX offerings in Massachusetts.

PBX is housed in a compact console cabinet (2CZ), comparable in size to a refrigerator, designed to complement office decor.

NET proposes to market this product under a tariff containing a fixed, non-recurring charge to implement the service and two alternative payment methods to maintain the service. 2/ The first method, Rate Plan I, more commonly known as the "Two Tier Payment Plan" ("2-Tier") is the focus of considerable controversy in this case. The alternative payment method, Rate Plan II, is the conventional monthly payment which continues as long as the service is maintained.

The 2-Tier payment method contains independently determined charges, Tier A and Tier B, as follows:

> Tier A is designed to recover capital costs 3/ and is payable over a fixed period of 3, 5, 7 or 10 years selected at the customer's option. It is a fixed amount, not subject to rate changes. If service is discontinued before the selected period is completed, the outstanding balance is then payable as a termination penalty.
>
> Tier B is designed to recover the on-going operational costs. 4/ It is a variable rate subject to rate changes, and continues as long as the equipment is in service.

Under the proposed 2-Tier tariff, the customer would be billed a combined Tier A and Tier B rate during the selected Tier A contract

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2/ This non-recurring charge is the same under both payment methods. Other one-time charges in the tariff are: (a) system establishment and feature package replacement; (b) feature information, and (c) equipment addition charge.

3/ Capital costs include the cost of money, depreciation expense, income taxes and other related items.

4/ Ongoing operational costs include, for example, maintenance, administration, property taxes, etc.

period of 3, 5, 7 or 10 years. After the contract period was completed, the customer would be billed only the Tier B rate.

The total monthly charge (combined Tiers A and B) under Plan I would be considerably lower than the monthly charge under Plan II, the conventional method. In developing these proposed rates, NET assumed that the Plan I, 2-Tier customer would retain service for a period of ten years (which NET contends is the equipment's useful economic life), and the equipment would not be reused. NET assumed that the Plan II, conventional customer would retain service on the average for three years, and the equipment would then be relocated and reused. The useful life of such equipment would be eight years, and additional installation costs would result incident to such relocation. 5/ Accordingly, NET structured its proposed rates to recover capital costs in ten years for Plan I customers and eight years for Plan II customers. Plan II rates also reflect anticipated additional relocation costs.

NET also adjusted the proposed Plan I, Tier A rates to reflect the time value of money. The Tier A contract price for option periods of less than ten years was "present worthed" or discounted at a 9% interest factor over the respective periods to determine the appropriate advanced payment amount. That is, the shorter the Tier A time period selected the greater the amount of the total discount

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5/ We note that additional non-recurring installation revenues would also result incident to such relocation.

in contract price. This discount price is attributed to the time value of the payments received in advance.

In summary, then, Tier A rates are designed to recover non-recurring capital costs and remain fixed for the life of the contract. However, new vintage Tier A rates may be filed from time to time. The second component, or Tier B rates, are designed to recoup recurring expenses and continue to apply so long as the customer receives Dimension PBX service. They are not set by the terms of the contract, are uniform for all subscribers and are subject to change to reflect general changes in Company cost levels.

Alternatively, Dimension PBX is offered under the conventional monthly payment plan (Plan II) which levies a uniform rate so long as the customer retains the service. With minor exception, Intervenors have not challenged the reasonableness of Plan II rates.

In support of this proposed tariff, NET has prepared a cost of service study which it contends shows that the tariff covers all "appropriate" costs, makes a significant contribution to the Company's overall revenue needs, protects existing investment, and is attractive to customers. This study attempted to identify specific costs for the 22 rate elements listed in Rate Plans I and II. The investment in equipment costs for Dimension PBX were identified, 6/ and used as the

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6/ The investment costs include cost of materials, sales taxes, transportation, supply, installation and engineering costs.

basis for determining the annual capital costs. 7/ Annual operating expenses were estimated and combined with the annual capital costs to determine the total annual costs incident to Dimension PBX.

This study has been called an incremental cost study by the Intervenors, but NET contends that it contains some elements of a fully distributed cost study. In general terms, NET has identified the costs caused by or directly attributable to Dimension PBX, but has not fully allocated common overhead costs 8/ to the product. NET contends, however, that some such allocation of common costs was made in this cost study.

The Intervenors, which manufacture and/or distribute products competitive with Dimension PBX, but not subject to regulation by this Department, contend that the NET proposed tariff, specifically the 2-Tier pricing aspect, is non-compensatory, discriminatory, predatory, and will require substantial cross-subsidization from the general body of ratepayers.

The Intervenors' first witness, Parker Ladd, the Executive Vice President of Intervenor-IBT, testified that 2-Tier pricing has "anticompetitive evils" because the long term contract "locks in" a customer to NET service and effectively "locks out" competition. He

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7/ Annual capital costs, as stated in footnote 3 include depreciation, cost of money, income taxes and related items.

8/ Overhead costs normally include expenses which are not directly assignable to any service classification item but pertain to all company services and equipment items.

contends that such a pricing mechanism, to the extent that it does not adequately cover the costs of Dimension PBX, will result in the elimination of competitors.

The Intervenors presented another witness, James A. Montanye, whose testimony purports to show, first, that the prices charged by NET's supplier, Western Electric Co. ("WECo"), do not recover costs, are anticompetitive and will require subsidization from the revenues produced by other products, because WECo excludes start-up costs 9/ in pricing the equipment; secondly, that the 2-Tier methodology in the proposed tariff does not reflect the income tax effects of collecting payments in advance. Payments are taxable when received and therefore larger earlier tax expense will be incurred under this 2-Tier method than under the conventional payment method. Mr. Montayne says that NET loses the earning potential of funds required for the prepaid taxes and also overpays the amount of the tax due on the return earned. That is, he says that the 2-Tier method operates to lower the effective return, and, as a consequence, the tariff is non-compensatory. Mr. Montanye further contends that NET's cost of service study understates capital costs and recurring expenses because of improperly computed percentage allocation factors.

9/ Start-up costs, such as research and development expenses, directly attributable to Dimension PBX.

In support of his contentions, Mr. Montanye presents a so-called fully distributed cost of service study. 10/ This study was prepared in the format suggested by a California Public Utilities Commission staff report. 11/

Mr. Montanye extensively disputes the Company's use of the Equated Cost of Money ("ECM") method for deriving cost of money and federal income tax requirements. He advocates the Forecasted Growth Reserve ("FGR") method as more appropriate for this type of product.

The ECM method theoretically shows an equalized average annual return on investment as opposed to the cash flow incident to such return. By applying this method, the Company assumed that fifty percent of plant is in service each year for the life of the investment. Theoretically, then, the total return realized over the life of the investment is the financial equivalent of the stated return, even though in terms of cash flow the return realized on net plant

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10/ The fully distributed cost methodology was supported in the Recommended Order in *FCC Docket 18128*, January 19, 1976 prepared by Common Carrier Bureau Chief Walter Hinchman. We note that this is a recommended rather than a final order of the Federal Communications Commission. The fully distributed cost methodology also appears to be supported by the recent Kansas Corporations Commission's Interim Order in *Docket 105, 712-U* and the Public Utilities Commission of Colorado, *Decision 87834*. Such methodology was also supported by this Department in its decision, *New England Telephone and Telegraph Co.*, D.P.U. 18210 (October 27, 1975).

11/ The format is derived from a report entitled *Rates for Specialized Telephone Equipment* and we note that it has never been formally adopted by the California Public Utilities Commission.

in the early years is substantially below the stated return. Such shortfall in the early years of the investment's life is supposedly offset by the larger returns realized in the later years when the investment becomes more than fifty percent depreciated. Such theoretical financial equivalency between stated and realized returns is achieved over the ten-year period of the investment's life because of the time value of money.

The Intervenors contend that the ECM method is inappropriate in this case. They contend that it does not represent reality and its only purpose is to reduce rates. Mr. Montanye says that ECM does not consider the impact of growth and other variables. He says that the impact of growth (marketing additional Dimension PBXs) has a depressing effect on earnings which is cumulative with additional growth.

Mr. Montanye advocates instead the FGR method which was used by NET for Rate Plan II. This method theoretically considers return and tax reserve in light of growth and retirements and accordingly more nearly simulates the economic realities for this type of product and reflects the pattern of costs to be experienced.

The FGR method as applied by Mr. Montanye results in substantially higher rates than the NET proposed rates. This witness based his calculations in part upon a larger net plant investment than did NET. He advocates the use of a theoretical reserve for depreciation which assumes that a much greater percentage of plant remains in service over the investment's useful life than the Company assumed. Accordingly, the theoretical depreciation reserve results in a larger net plant investment on which cost of capital and federal income taxes are computed.

Mr. Montanye also contests the Company's use of present worth as a price setting technique. Additionally, he contends that the fixed term of the Tier A contract would usurp Department regulation during that period and that new vintage rates would be confusing and render administration of the tariff difficult.

In response to these contentions, NET has provided considerable evidence to show the justification for its proposed tariff. The Company has also prepared competitive market analyses which purport to show NET's relative position in the market. Some of this data, as discussed infra, is treated as proprietary for purposes of this proceeding.

MOTIONS AND RULINGS

Motion for Reconsideration of Suspense Order

The Company moved that the Department vacate its Suspense Order of June 12, 1975, which suspended the proposed tariff until April 22, 1976. Memoranda and arguments were presented by the parties. The motion was taken under advisement. No ruling was made on the motion during the course of this case. The motion is effectively rendered moot by the issuance of this Order.

Motion with Respect to the Proprietary Nature of Certain Exhibits

During the course of this proceeding, a claim of privileged information was asserted with respect to certain exhibits and information. It was claimed that this information was of a proprietary nature. Arguments and memoranda were received on this question. By letter dated March 11, 1976, subsequent to the close of hearings, the Department advised the parties of its determination that certain exhibits would be treated as proprietary for purposes of this proceeding. These exhibits are identified as follows:

Intervenors' Exhibit 3

"DCF Summary, Dimension and Series 200 versus Competitive Technology PBX's"

Intervenors' Exhibit 4

"Cost Comparison, Competitive versus Western Electric Company"

NET Exhibit 12

"Customer Premises Forecast of Results, Bell Customer Only"

NET Exhibit 13

"Customer Switching System 201 (CSS 201) Basic Cabinet (5 Carrier), Price Calculation - January 1, 1975"

Such exhibits are maintained in a protected portion of the record.

DISCUSSION

The present proceeding involves broader issues of public policy than the appropriateness of Dimension PBX rates. Prior to June 1968, the Company was the sole supplier of PBX telephone equipment in the Commonwealth and possessed an absolute monopoly in the rendition of the service. This monopoly was obtained unlawfully. In 1968, in the Carterfone decision (13 FCC 2d 420), the Federal Communications Commission ("FCC") held that the tariffs prohibiting the interconnection of customer-furnished terminal equipment were unlawful and had been so since the inception of the tariff.

In determining whether Dimension PBX rates are just and reasonable, we think that it is pertinent to consider whether the proposed rates and practices are or may be reasonably expected to be anti-competitive. See Re: Mountain States Telephone and Telegraph Company, Docket No. 881 (Colo. P.U.C., November 26, 1975). The immediate question relates to the position of NET in the relevant market and the possible competitive consequences of 2-Tier pricing. The relevant market may be defined as PBX service in the NET territory of Massachusetts. As of 1975, there were 5,180 PBX telephone systems owned and maintained by NET. The independent, interconnect firms in the eight-year period 1968-76 installed approximately 300 dial PBXs in Massachusetts. The Company anticipates leasing more than 150 Dimension PBXs in 1976. On the basis of its 95 percent market share, and its overall financial and economic strength, it appears that NET, at this time, has a dominant position in the PBX market.

Competition in the customer terminal equipment market has evoked effective supplier response both on the part of new entrants and on the part of the Company. In an area of communication supply which had virtually stagnated since World War II, customers have benefitted through introduction of new technology, an abundance of new features and active price competition. The pricing methods advocated by the Company in this case appear to be an indication of its long range pricing policy for competitive offerings. For this reason, it is important for the Department to set forth its policy with respect to the pricing of competitive offerings.

In setting rates for the competitive service offerings of the Company, the Department does not seek to set rates at excessively high levels so as to overcharge customers of these competitive services. Excessive rates would artificially encourage the entrance of additional vendors.

One objective of rate-making is the promotion of economic efficiency--the effective utilization of the economic resources of the society. In a competitive market, price serves as a benchmark to either encourage or discourage product entrants. Regulation is generally considered the substitute for competitive market forces in the natural monopoly situation. In the monopoly/competitive dichotomy here presented, the role of regulation is crucial. The prices set for competitive services should not be set so low as to entail cross-subsidization from other classes of service. Consistent with our views in *New England Telephone and Telegraph Company*, D.P.U. 18210 (October 27, 1975), we shall adhere to a full cost basis in approving rates for competitive equipment items. 12/ Rates established on the basis of fully allocated costs result in an equitable portion of common overhead being assessed to the areas of individual equipment items and concurrently avoids the potential burden on other classes of users which can be imposed by a "value" pricing approach.

The Company's intrastate revenue requirements are calculated on the basis of a historical test year analysis of the *costs actually incurred* by the Company. This includes the expenses actually incurred and a rate of return applied to the investments actually made.

12/ In that case, D.P.U. 18210, this Department ordered NET to conduct a fully allocated cost study in accordance with specific cost guidelines. In these guidelines, the Department recognized "that there will remain a residue of common expenses which cannot be directly assigned to service classifications." The Department went on to specify that "In such cases, allocation will be made on the basis of the principles stated herein."

The sum of the revenue levels of the individual service classifications, i.e., local exchange, state message toll, state private line, and vertical services, such as Dimension PBX, must achieve the overall intrastate revenue requirement.

However, when revenue requirements for an individual equipment item such as Dimension PBX are determined in such fashion as to leave a revenue deficiency, the deficiency is recouped through rates earned from other services and service classifications. It is precisely this question which confronts the Department in the present proceeding.

NET has a positive incentive to engage in anti-competitive and cross-subsidy pricing practices. This incentive arises as a result of the traditional revenue requirement method of regulation followed by the Department. Such a method is oriented toward an overall rate of return for all NET services. It is possible under present regulatory methods for NET to engage in cross-subsidy practices without suffering any loss in its overall level of return.

The provision of PBX service is a very small part of the Company's total state business. The enormous size of the monopoly exchange and message toll services engulfs the impact of NET's competitive services, including PBX. Because there is substantial incentive for NET to engage in anti-competitive pricing practices, it is crucial for this Department to impose the most rigorous standards of accountability and justification upon NET for its competitive tariff filings, such as Dimension PBX.

The 2-Tier Approach

A major source of controversy in the present proceeding centers on the methodology followed by NET in the development of its monthly A rate in the 2-Tier approach. The starting point for NET's development of the Tier A rate is the calculation of average annual net book investment over the estimated 10-year life of Dimension PBX. A return factor of 12 percent is applied to the average net investment. The Department approves an objective level of return for competitive products, despite its departure from the overall return prescribed in D.P.U. 18210. Differential earnings appear to us to be proper in view of the higher degree of business risk, the pressure of market competition and the potential technological obsolescence in the competitive PBX market.

The objective rate of return is applied to determine a uniform annual revenue requirement over the 10-year period. Depreciation and income taxes are calculated over the same period. The final step is the conversion of the annual revenues required over the 10-year period to an equivalent annuity payment assuming an interest rate of 9 percent, the time value of money assumed applicable to a Dimension PBX customer.

A key component of the 2-Tier methodology is the ECM principle discussed earlier. This is the principle under which reimbursement for capital costs would be obtained. As we see it, the ECM procedure is a completely valid procedure for preparing engineering economy studies, i.e., making investment choices when capital additions and revenues are contemplated at different time intervals. We find the application of the ECM methodology, however, wholly inappropriate for utility ratemaking. Table I is an abbreviated example of the application of the ECM method with investment data and annual payments drawn from the record.

TABLE I

(1) Year	(2) Investment	(3) Book Deprec. @ 8.6%	(4) Return @ 12%	(5) State & Fed. Income Tax @ .5814	(6) Capital Req'ts	(7) Annual Itemized Payments
0	$9,418					
1	8,608	810	1,082	629	2,521	1,788
2	7,798	810	984	572	2,366	1,788
3	6,988	810	887	516	2,213	1,788
4	6,178	810	790	459	2,059	1,788
5	5,368	810	693	403	1,906	1,788
6	4,558	810	596	347	1,753	1,788
7	3,748	810	498	290	1,598	1,788
8	2,938	810	401	233	1,444	1,788
9	2,128	810	304	177	1,291	1,788
10	1,318	810	207	120	1,137	1,788

Notes:

Column (2) is from NET Exh. 2A, page 2, Column B, Line 9 and represents the Company's estimate of total plant investment for the 2CZ element of the Dimension PBX.

Column (3) is 9418 gross investment times Commission prescribed depreciation rate of 8.6%.

Column (4) return at 12% is applied to average net investment, the average of beginning and end of year.

Column (5) State and Federal income taxes are applied to the equity portion of return (55%). The state and local income tax factor is .5814. Each entry in Col (5) = Col (4) x .5814.

Column (6) is the sum of the preceding 3 columns.

Column (7) is the annual annuity payment calculated in NET Exh. 2A, page 2, Column D, line 7.

It will be noted that only after the mid-point of the estimated 10-year service life will the Company be enabled to recover through proposed annuity payments a sufficient sum to recover its book depreciation, return and income taxes. The amortization payment (Tier A) is intended to recover the payment for return on capital plus repayment of capital. The mathematics of the Company's demonstration are impeccable; over the entire service life of 10 years, assuming that all factors remain constant, such recovery will be achieved.

The illustration in Table I, however, deals with a single unit of plant. If we were dealing with a static plant, the impact on total revenues would not be perceptible. However, 2-Tier pricing is being proposed by NET for its most advanced and presumably most rapidly growing PBX service offering. Under situations of market growth, we have essentially a negative "flow-through" effect. Table II illustrates this point, still maintaining simplified assumptions. It assumes that instead of a single $9,418 investment (2CZ cabinet) amortized over a 10-year life, an additional such investment is made once each year for the 10-year period. As the gross plant investment increases year by year, the cumulative revenue deficiency between the sum of annuity payments and the corresponding depreciation, return and taxes widens.

TABLE II

Illustrative Table Showing Cumulative Effect on Net Revenues of Installing One Dimension (2CZ) Component in Each of Ten Successive Years

Year [Vintage]	1	2	3	4	5	6	7	8	9	10
0										
1	-$733	-$733	-$733	-$733	-$733	-$733	-$733	-$733	-$733	-$733
2		-$578	-$578	-$578	-$578	-$578	-$578	-$578	-$578	-$578
3			-$425	-$425	-$425	-$425	-$425	-$425	-$425	-$425
4				-$271	-$271	-$271	-$271	-$271	-$271	-$271
5					-$118	-$118	-$118	-$118	-$118	-$118
6						+$35	+$35	+$35	+$35	+$35
7							+$190	+$190	+$190	+$190
8								+$344	+$344	+$344
9									+$497	+$497
10										+$651
Totals:	-$733	-$1311	-$1736	-$2007	-$2125	-$2090	-$1900	-$1556	-$1059	-$408

Note:

The entry for each year is derived as the difference between Column (6) and Column (7), Table I.

The Company can contemplate the offering of 2-Tier pricing on a present worth annuity basis only because of its monopoly position. Approximately ninety percent of Company revenues are derived from monopoly service classifications. Deficiencies in revenues during the early years of Dimension PBX service can be recouped through overall statewide rate-of-return adjustments. To apply ECM procedures universally to all NET services would ensure corporate insolvency.

There are other aspects of 2-Tier contracts to which the Department takes exception. Tier A contract terms are guaranteed for the duration of the contract period (3-5-7 or 10 years). Tier A prices are therefore founded upon an assumption of fixed earnings and tax rates. Between 1970 and 1975, the Department has authorized four increases in earning rates for NET (D.P.U. 16253, 17150, 17441 and 18210). The federal corporate income tax rate has fluctuated between 48 and 52 percent, while income tax rates in the Commonwealth have increased over the past decade. Under these uncertain conditions, there is no assurance what the required level of capital costs and tax rates will be five years from now, let alone for the next decade.

Under conditions of rising capital costs and income taxes, Plan I customers would be insulated from any increase in these costs. 13/

13/Conversely, of course, Plan I customers would subsidize other services in the event of decline in these costs.

In the event of an increase in such costs, NET would properly stay "whole" in that it would be entitled to recover all the taxes and a fair rate of return on its total investment. If revenue deficiencies were incurred in future years, they would be recouped from other classes of ratepayers.

In the development of the income tax factor, the Company offsets the standard federal and state revenue tax rates by proportionate amounts attributable to the Investment Tax Credit ("ITC") and accelerated tax depreciation. Historically, the Bell System has opposed adoption of rapid tax writeoffs, maintaining this position until the federal tax law was amended to require treatment through tax "normalization". However, in this instance, for the purpose of determining the costs of providing a competitive service, NET has reversed this historic position and, in effect, proposes direct "flow through" of tax benefits. To accept the Company's proposed tax treatment would result in an unfair advantage for this service, notwithstanding the tax detriments of prepaid revenues.

In this tariff, the Company proposes to exempt the Dimension PBX customers from contributing to the revenues produced by such sources as ADR (Asset Depreciation Range) or ITC. Yet, at the same time, such customers would be the beneficiaries of monies contributed for the same purpose by all other classes of ratepayers. We deem such ratemaking treatment unjustly discriminatory.

Accordingly, the 2-Tier plan can be rejected on the basis that it is unjustly discriminatory as against other classes of ratepayers. There is, however, another question to consider. That question is whether the absence of a long-term contract plan unfairly handicaps NET in the competitive market. The record discloses an overwhelmingly negative response to this query. No interconnect firm could afford to provide terms similar to Plan I. NET can consider the ECM aspect of Plan I because of its vast monopoly reservoir. The contract terms proferred by the Intervenors appear to contain significantly more burdensome financial terms, higher capital costs and take no account of present worth considerations. NET has the tremendous marketing advantage of knowledge of its customers, their location, and the expiration dates of their existing services. For the Intervenors, this is important market information yet to be obtained.

The record makes it quite clear that NET considers Dimension PBX a superior product. At one point in the hearings, the NET witness, Mr. Perkins, conceded that the Company would sell the same number of Dimension PBXs, whether or not it offered its customers the 2-Tier contract option. 14/

14/ After reconsideration, Mr. Perkins partially backtracked on that admission.

In order to evaluate the practical advantages which the Company should have with respect to meeting market competition in the future, we find the post-Carterfone history to be most informative. Dimension is the first solid state, time division switch offered by NET in competition with other products which had previously entered the market. While the record does not disclose the magnitude of interconnect firms' marketing staffs, it is doubtful if their total numbers could equate to the NET business marketing group. In the eight years since Carterfone, the competitors have barely garnered five percent of the Massachusetts PBX market. It would appear, then, that the absence of 2-Tier contracts will not unduly handicap the Company.

For the reasons discussed above, the Department rejects Plan I, the 2-Tier pricing approach submitted by NET.

It is now appropriate to address the propriety of the rates proposed under Plan II. Such analysis centers on the cost study submitted by the Company in support of the proposed rates.

In evaluating the Plan II rates, the contentions and cost data of the parties were duly considered. We find that the Company's cost study failed adequately to assign costs to Dimension PBX. We find further that the Intervenors' cost study exaggerates the costs attributable to Dimension PBX. In many respects, the Intervenors' cost study is as divorced from reality as that of the Company.

Accordingly, we were unable to rely on either cost study as the basis for setting rates. In the discussion which follows, we have defined the adjustments which are necessary to make the price of Dimension PBX both competitive and compensatory in light of the pricing principles set forth in this order and the cost principles set forth in D.P.U. 18210 _supra_.

Cost Considerations

The Company's cost of service study is seriously deficient in its failure to allocate the costs incident to Dimension PBX. This deficiency is particularly acute with respect to the costs developed by the Company's supplier, WECo. 15/ In developing its costs, WECo assigned all research and development costs ("R&D") incident to Dimension PBX to the so-called "customer premise product line". This treatment results in an inadequate allocation of the costs when such costs are the basis of pricing a competitive product.

The Company presented as a witness, W. E. Thornton, of WECo, who contended that WECo's practice of spreading R&D over a product line instead of assigning it to a particular product is consistent with industry practice in multi-product industries, and is in conformity with generally accepted accounting principles. Further, he contended that such treatment is proper because there is a cross-fertilization of ideas associated with R&D efforts such that R&D costs cannot be independently assigned to one product.

15/ In refiling any adjusted rates in conformity with this Order, the Company will be required to use the 1976 WECo material prices.

The Department does not disagree that such accounting practice is normal. In the circumstances here present, however, the use of cost data so accumulated as the justification for pricing a competitive product places an inordinate burden on non-competitive classes of service. The customer premise product-line to which this R&D is assigned consists largely of basic non-competitive telephone equipment which is located on the customer's premises, e.g., all basic residential telephone handsets. Thus, the residential ratepayer, for instance, is bearing the R&D associated with a sophisticated product such as Dimension PBX, even though there is no correlation between the character or capability of the equipment or the communications needs of the respective subscribers.

While all of WECo's contentions with respect to its cost accounting methodology may be correct, the fact is that costing and pricing are distinct functions. 16/ Such distinction is made all the more pronounced by the monopoly/competitive dichotomy present in this case. Hence, cost information accumulated in a manner which is consistent with generally accepted accounting principles and industry practice may still generate costs which are an inadequate foundation for pricing in accordance with the regulatory standards discussed above. 17/

16/ A point which the WECo witness elaborated quite extensively.

17/ The Accounting Principles Board recognized the likelihood of differences in generally accepted accounting and regulatory accounting in The Journal of Public Accountancy, December 1962, p. 67

This Department does not regulate WECo and may not exercise any direct control over the prices charged by the manufacturing affiliate to the Company. The Department does exercise regulatory authority over the Company. In the exercise of this responsibility, one objective is to avoid the cross-subsidization of competitive service offerings by charges levied on the monopoly markets. Materials purchased by NET from WECo constitute a major portion of the investment base of the Company. Accordingly, the Company is ordered to recalculate the costs of Dimension PBX materials procured from WECo so as to include the full pro-rata share of R&D costs. These costs should be amortized over a four-year market period. In order to avoid duplication of capital recorded expenditures, the amount of this charge should be offset by a corresponding credit to the remaining classes of customer premises equipment (handsets, older PBXs, key systems, data machines, etc.). NET is hereby directed to furnish the Department the supporting documentation for this adjustment.

The treatment of R&D is only one illustration of the Company's failure to allocate fully the costs incident to Dimension PBX. The Company's study attempts to isolate the direct costs and a portion of the indirect costs attributable to the rendition of Dimension PBX service. But for the existing plant supported by the monopoly services, for example, Dimension PBX would require a plant facility and all the costs incident thereto. Dimension PBX clearly gets a benefit from existing facilities and should bear a proper portion of their cost. The monopoly service customers should not be required to support the facilities for competitive products. Unregulated competitors do not have such a customer base to support their basic facilities. Competitors must recover all costs through their product's selling price in order to survive financially. Therefore, if NET is to compete fairly and not receive subsidization from its monopoly services, its competitive products must bear their pro rata share of all common costs.

The Company's cost study understates quite dramatically both direct and indirect costs incident to Dimension PBX. This is shown in our analysis of the cost factors as derived by the Company and discussed below.

Western Electric Tax Deferral

Since 1970, NET has participated in the filing of a consolidated federal income tax return by the parent company, American Telephone and Telegraph Company ("AT&T"). The effect of such filing is to return to the operating telephone companies, such as NET, the funds generated by the deferral of tax on intercompany profits realized by WECo on sales of equipment which were capitalized in the accounts of the operating telephone companies.

The NET cost witness, Mr. Orsini, reduced the cost of Dimension PBX materials purchased from WECo by 3.34 percent to reflect this credit. The amount of the plant credit received by NET as the result of the consolidated tax return is not distinguishable by class of plant or apparatus acquired. The record establishes that manufacture of Dimension PBXs did not get under way until 1974. The only information available to the Department as to the magnitude of the WECo tax credit arising from the consolidated tax return is for the year 1974. This data does not support the factor employed by the Company.

TABLE III

Calculation of Ratio of Plant Credit Arising from Consolidated Tax Return to NET Purchases from WECo 1974

1.	NET Reduction in Consolidated FIT, NET, 1974	$ 6,714,024
2.	NET Purchases from WECo, 1974	$278,580,731
3.	Ratio (1) ÷ (2)	2.41%

Source: Form M, NET 1974 Schedules 10, Note 6
and Schedule 43.

The materials credit must be adjusted accordingly.

Depreciation Reserve Ratio

The percent depreciation reserve is an important element in calculating earnings and income tax requirements. Dimension PBX service has not yet been furnished to Massachusetts subscribers; therefore, the accumulated depreciation reserve representing the capital contribution of ratepayers is zero. However, it would be inappropriate to establish rates on this basis inasmuch as depreciation accrues from the time the Dimension PBX investment is added to --

the Plant Account 234. Under Plan I, NET has proposed the use of a fifty percent reserve factor in estimating average net plant. Even under group depreciation methods, this method assures that until the equipment half-life is attained, NET would not obtain its objective return from Dimension PBX customers. As an alternative, the reserve ratio for the Company as a whole (22.4%) could be employed.

The Company has criticized the use by the Intervenors of the theoretical depreciation reserve ratio (15.71%). A valid criticism is that the status of the theoretical reserve lags with the 3-year interval of depreciation prescription. Our judgment to employ the theoretical reserve hinges on the Company's forecasted rapid growth character of the Dimension PBX.

The Company had the burden of providing more accurate data. NET maintains its primary books and records pursuant to Part 31 of the Uniform System of Accounts prescribed by the FCC. Since its adoption in 1934, Part 31 has required:

> ...For purposes of analysis, the company shall maintain subsidiary records in which the depreciation reserve is broken down into component parts corresponding to the primary plant accounts which include depreciable telephone plant; these subsidiary records shall show the current credits and debits to the reserve in complete detail by such primary plant accounts. Part 31, U.S.A., Par. 171(C)

The Company has chosen to disregard this section.

Premature Obsolescence

In establishing guidelines for the costing of Dimension PBX, NET witnesses have emphasized the "relevancy" or "appropriateness" of such costs before acknowledging their application to this equipment item. Dimension is a solid-state, time division switch offering significant service features in advance of all the PBX equipment currently furnished by the Company in Massachusetts. Significant cross-elasticity between PBX systems exist within the Company. There would appear to be far greater likelihood of premature PBX obsolescence due to the infusion of its new, advanced Dimension PBX product than to any successful competitive inroads made by interconnect suppliers. When petitioning this Department for new, higher authorized depreciation rates for large PBX equipment (Account 234), the Company has recognized this state of affairs:

> Evolving technology will continue to have a life shortening effect upon our existing Large Private Branch Exchange investment. [18/] As we continue to introduce and develop electronic Private Branch Exchanges to meet our customers expanding needs, we compete with our own Private Branch Exchanges presently in service. For example, in January 1975, American Telephone and Telegraph announced introduction of Dimension PBX, a stored program control, solid state system utilizing time division switching. This new PBX series will provide some features not available today in any single system... .

Source: NET Depreciation Rate Study, State of Massachusetts 1975 Large PBX Equipment, p.2.

18/ $133.7 million.

The reasoning adopted by the Company in requesting increased depreciation rates was accepted by the Department and the FCC. The net change in annual accruals, effective January 1, 1975, applicable to the Large PBX account, resulted in an increase of about $1.5 million in depreciation expense. While recognizing the need to adjust depreciation rates applicable to the Large PBX account, we are also mindful that the incidence of costs should be borne proportionately by the beneficiaries of the improved plant.

When the vendor of a product or service in a competitive market chooses to introduce a new, improved version of his previous products or services, the improved product incorporates the cost of rendering obsolete his existing wares. NET has chosen not to recognize this effect. The net result of such a decision would be to burden conventional ratepayers with benefits only remotely related to their services. Therefore, NET's cost of service study must be adjusted to reflect premature obsolescence of existing PBX equipment coincident with the introduction of Dimension PBX.

License Contract Charges

Between 1948 and September 30, 1974, AT&T has billed NET for general service fees at one percent of operating revenues (less uncollectibles). Effective October 1, 1974, AT&T unilaterally altered this arrangment and began billing on the basis of allocated costs associated with the provisions of these services. In D.P.U. 18210, supra, NET unsuccessfully sought ratemaking recognition of these higher costs, alleging that the costs of such services exceed the prior basis of billing.

The record in the present proceeding indicates one potential source of the mounting costs incurred by the parent company in furnishing "advice and assistance" to the operating companies. In order to meet competition, the parent company undertook large scale planning and coordination efforts, prepared the "Two-Tier Contract Plan", directed methods of market study, prepared illustrative tariffs and contract forms, prepared a "Dimension Product Binder" and extensive documentation on how an operating company, such as NET, should conduct its coordinated effort. It would appear that these costs are and will be of a recurrent annual nature applicable to the Company's competitive products. Accordingly, recognition of these charges should be reflected at one percent of revenues in the development of the adjusted cost for Dimension PBX.

Annual Maintenance Expense

The Company does not know the annual recurring cost of maintaining the Dimension PBX, since it is a new system employing new switching principles. Maintenance has been estimated on the basis of a special study at 1.9 percent of plant investment. Overall statewide experience in the maintenance of Large PBX equipment is approximately 6.67 percent, as shown below in Table IV.

TABLE IV

Development of Maintenance-to-Plant Rates NET Large Private Branch Exchange Equipment, December 31, 1974

1.	1974 Maintenance, Large PBX	$ 8,648,326
2.	Average Investment, 1974, Large PBX	$129,870,826
3.	Maintenance-to-Plant Ratio	6.67%

Source: Monthly Statements No. 7 and 2A,
NET, December, 1974

A major portion of Company's PBX investment is in conventional electro-mechanical systems (701 and 740). For valid reasons set forth by the Company, the incidence of maintenance per dollar of plant investment should be lower than existing facilities. Diagnostic tools are incorporated on the basic machine to permit quick identification of trouble faults. Repair should normally be conducted by replacement of a "plug-in" component card, rather than the relatively time-consuming tests necessary with step-by-step systems. On the other hand, the rapidity of repair is dependent upon the replacement parts inventory which must become a critical part in the total cost of maintenance. While the Company's cost study recognizes the cost of back-up materials in the development of initial investment, no apparent recognition was given to the cost of these materials in developing annual maintenance expense.

In turning to alternative information sources in the record, the Department reviewed maintenance charges levied by interconnect suppliers. Going maintenance charges vary among independent suppliers from twelve to twenty dollars a station a year. But these data are not really comparable to NET factors. Maintenance charges of the interconnect firms include upkeep and moves of station apparatus, as well as the trunk connecting protective devices.

On the basis of the limited evidence in the record, the Department concludes that a maintenance-to-plant ratio of three percent should be employed for rate estimating purposes. This factor is less than half the relative level of conventional systems, although higher than estimated by Company witnesses.

At the parent company's suggestion, the Company is establishing detached "Keep Cost" records for Dimension PBX customers. With this Order, we will require that a copy of such studies be furnished the Department. If subsequent cost experience indicates that maintenance expense has been overestimated, we will amend this Order to provide that the benefits flow through to Dimension PBX customers.

Ad Valorem Taxes

The Company has estimated ad valorem taxes in its Dimension PBX cost of service study at .2 percent of plant investment. This is not reconcilable with the Company's statewide experience in Massachusetts.

TABLE V

Ratio, Massachusetts Property Taxes to
Plant in Service, 1974

1.	Local Property Taxes	$ 73,279,000
2.	Telephone Plant in Service	$2,723,059,000
3.	Ratio: (1) ÷ (2)	2.69%

Source: D.P.U. 18210, NET Exhibit 3-A,
Attachments F and G

We see no reason why Dimension PBX ratepayers should not pay their pro-rata share of property tax costs incurred by NET. The study must be adjusted accordingly.

Administration Expenses

The NET cost witness estimated administrative costs applicable to Dimension PBX at 2 percent of plant investment. Mr. Perkins, the NET rate witness, adjusted the cost study results by adding a 3.2 percent factor.. Intervenors, in their cost study, have urged an administrative expense factor of 9.43 percent.

However, the origin of the Intervenors' factor would clearly double-count Company expenditures. It is apparent from the record that Dimension PBX customers impose at least a pro-rata share of general company overhead costs as do all other classes of service. For example, a separate tracking plan will be established to determine costs and profitability of Dimension PBX systems.

The Company's intrastate revenue requirements are calculated on the basis of a historical test year analysis of the costs actually incurred by the Company. This includes the expenses actually incurred and a rate of return applied to the investments actually made.

The 5.2 percent administrative factor, as adjusted by Mr. Perkins, should be at least at the level of the Company's state factor developed for use in plant extension engineering. The factor must be adjusted accordingly.

The Company is hereby ordered to provide the workpapers underlying the development of this factor.

In view of all the foregoing deficiencies in the Company's cost study, the Department is faced with two alternatives. One alternative is to reject the rates proposed under Plan II in their entirety and order the Company to prepare a new cost study consistent with the guidelines of this Order and D.P.U. 18210. The other is to make the adjustments discussed above and permit the Company to market Dimension PBX under such adjusted rates.

The Company has been precluded from marketing Dimension PBX during the pendency of this investigation. Continuing such restriction by rejecting the rates in their entirety would be a hardship in a competitive market. The Department's finding is that the marketing of Dimension PBX under the Plan II rates, as adjusted, will not unduly burden other classes of service, and will afford the Company the opportunity to enter the market and compete. Accordingly, the

Company may file rates and charges under Plan II discussed herein. The Department will review such adjusted rates and make a determination as to their conformity with this Order within fourteen days of their filing.

Accordingly, after notice, public hearing and consideration, it is

ORDERED: That the rates and tariffs filed in this case with respect to Dimension PBX be and hereby are disallowed; and it is further

ORDERED: That the Two-Tier rate structure proposed by the Company be and hereby is rejected; and it is further

ORDERED: That the Company may file new rates and charges for Dimension PBX in accordance with this Order, together with the supporting data for such filing; such rates and charges shall not become effective earlier than fourteen days after the date of their filing.

By Order of the Department,

/s/ HAROLD J. KEOHANE

Harold J. Keohane, Chairman

/s/ EUNICE P. HOWE

Eunice P. Howe, Commissioner

/s/ REGINALD C. LINDSAY

Reginald C. Lindsay, Commissioner

A true copy,
Attest:

Harold J. Keohane
Chairman

Appeal as to ma[illegible]f law from any final decision, order or ruling of the Commission may [illegible]n to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Commission be modified or set aside in whole or in part.

Such petition for appeal shall be filed with the Secretary of the Commission within twenty days after the date of service of the decision, order or ruling of the commission or within such further time as the commission will allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. (Sec. 5, Chapter 25, G.L., Ter. Ed. as most recently amended by Chapter 485 of the Acts of 1971).

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
32 AVENUE OF THE AMERICAS
NEW YORK, NEW YORK 10013

May 17, 1976

RECEIVED
MAY 19 1976
MWK

Edward R. DeVaughn, Esq.
Common Carrier Bureau
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Dear Mr. DeVaughn:

This is in response to your letter dated May 7, 1976 (Ref. 9500), in reference to materials supplied by AT&T in response to the Common Carrier Bureau's request for additional information with respect to AT&T's DATASPEED^{R} 40/4 tariff filing, Transmittal No. 12449.

Attached herewith is a list of materials provided by AT&T which contain trade secret and confidential business information which is not customarily released to the public because disclosure would result in substantial competitive harm to AT&T (See Section 0.457(d) of the Commission's Rules).

Items 1-3 contain detailed information regarding AT&T marketing strategies, equipment requirements and certain marketing information concerning private line customers. Items 4-17 contain detailed technical information relating to the design and operation of various models of teletypewriter equipment including DATASPEED 40.

All of this information was specifically prepared for Bell System internal use only. None of it is made available to the public because its disclosure to competitors would cause substantial competitive harm to the Company.

In particular, a competitor armed with the above marketing information could decide in which products and markets he chooses to compete. It would thus enable him to select only the most profitable market and service areas, leaving the Company with those which are unprofitable or marginal and thereby undermining its rate base.

In addition, both the marketing and technical information represent the product of a great expenditure of time, effort and money by AT&T. The disclosure of this information would, therefore, give a competitor a substantial cost advantage in planning, developing and marketing its own similar equipment. Disclosure would, in addition, substantially reduce a competitor's chance of error, i.e., developing and marketing the wrong or least profitable equipment.

Items 18 and 19 are multi-client studies purchased by AT&T under contract with Arthur D. Little, Inc. and Quantum Science. Under the terms of these contracts, AT&T may not make the information in the studies available to third parties. The studies constitute a large investment on the part of A. D. Little and Quantum Science and were obtained by AT&T at considerable expense. The value of the studies lies in the fact that they have a limited distribution. This value would be seriously diminished to the producers and purchasers of the studies if they were made routinely available for public inspection. Furthermore, release of these materials for public inspection could constitute a breach of AT&T's contractual relationship with A. D. Little and Quantum Science.

While the Commission may have a legitimate reason for reviewing these documents, permitting these documents to be routinely available for public inspection would give competitors an unfair advantage-- a "free ride" at the expense of AT&T and ultimately its customers.

Accordingly, it is hereby requested, pursuant to Section 0.459 of the Rules that these documents and their contents be withheld from public inspection and not be made routinely available to the public.

In the event that our request for confidentiality should be denied, it is respectfully requested, pursuant to Section 0.459(e) of the Rules, that these documents, and all copies thereof, be returned to AT&T without consideration by the Common Carrier Bureau.

Very truly yours,

William V. Catucci

William V. Catucci
Attorney

Attachment
cc: Ms. Ruth V. Reel, Chief, Tariffs & Services Division
David Anderson, Esq. (IBM)
Joseph Kittner, Esq. (CBEMA)
Terry Mahn, Esq. (CIA)

ATTACHMENT

AT&T Marketing Studies

1. Market Research - DATASPEED 40 - Market Study (January 1974)
2. Market Forecasts for Synchronous DATASPEED 40 (DRAFT) (1975)
3. Cluster Controller Survey (1975)

AT&T Market Letters

4. Teletypewriter Compatible DATASPEED 40 Service, GL: 75-10-062
5. Synchronous DATASPEED 40, GL: 75-09-150, September 19, 1975
6. DATASPEED 40 - Multipoint Private Line, GL: 74-08-114, August 16, 1974
7. DATASPEED 40, GL: 73-06-147, June 22, 1973

AT&T Engineering Letters

8. DATASPEED 40-8A1/8B1 Selective Calling Station, GL: 74-07-125, July 23, 1974
9. Synchronous DATASPEED 40, GL: 75-09-188, September 29, 1975
10. DATASPEED 40, GL: 73-06-100, June 22, 1973
11. CONTROLMATIC Model 35 Teletypewriter, E.L. 127, October 25, 1968
12. Teletypewriter Compatible DATASPEED 40, GL: 75-11-135, November 24, 1975

Bell System Practices

13. Publication #582-200-100
14. Publication #582-211-100
15. Publication #579-505-353
16. Publication #999-300-121
17. Publication #999-300-123

Outside Marketing Studies

18. "Remote Computer Markets Communications, Terminals and Applications, 1974-1980," Volume Four, Quantum Science, March 1975.
19. Arthur D. Little, Inc., "Outlook for Computer Terminals in a Changing Competitive Environment" June, 1975.

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

May 20, 1976

IN REPLY REFER TO:
9550

Honorable Thomas E. Kauper
Assistant Attorney General
Antitrust Division
United States Department of Justice
Washington, D. C. 20530

Gentlemen:

The Commission presently has under consideration a Petition for Review of a Memorandum Opinion and Order which we issued on March 3, 1976, a copy of which is attached. The Order rejects a tariff filing of the American Telephone and Telegraph Company (AT&T) offering a private line service of terminal equipment, termed Dataspeed 40, to be used in association with a voice grade interstate channel.

The tariff was rejected on the basis that it was found to be an integral part of a data processing service, rather than communications service, and thus it could not be offered by a communications common carrier pursuant to Section 64.702 of the Commission's Rules, 47 C.F.R. 64.702. That Section requires, inter alia, that data processing services may be offered only by corporate entities separate from those offering communications common carrier services. Since the Dataspeed 40 offering was found to be a data processing service, the tariff under which AT&T was offering it was held unlawful.

The impact of this action on most common carriers would not be too significant since they would be able to offer the data processing service through a separate subsidiary. In the case of AT&T, however, United States v. Western Electric Co., Inc. and AT&T (consent judgment), 13 RR 2134, 1956 Trade Cases 71, 134 filed January 24, 1956, D.C., N.J. (1956 Consent Judgment) brings into question the ability of AT&T to offer Dataspeed 40 through a separate corporation. My purpose in writing this letter, therefore, is to request your opinion as to whether AT&T, pursuant to the 1956 Consent Judgment, would be permitted to offer the Dataspeed 40 equipment for sale or lease through a non-common carrier subsidiary, such as Teletype Corporation.

Since the pleadings on petition for review are almost complete, the Commission will be considering the lawfulness of the Dataspeed 40 tariff quite soon. We would therefore appreciate a reply at the earliest practicable time.

Sincerely,

Walter R. Hinchman
Chief, Common Carrier Bureau

Attachment

9700

Jonathan C. Rose, Esquire
Associate Deputy Attorney General
Department of Justice
Washington, D. C. 20530

Dear Mr. Rose:

The Commission has presently before it a filing by the American Telephone and Telegraph Company (AT&T) proposing to offer a new service consisting of the provision of a Dataspeed 40/4 terminal for use with its Dataphone Digital Service as well as its voice-grade private line service. In comments relating to this offering the matter of the 1956 consent decree has been raised. Prior to making a final recommendation regarding the Dataspeed 40/4 offering, the Common Carrier Bureau is attempting to fully understand all the public interest factors involved including the consent decree's relevance to this matter.

We are therefore inquiring whether the consent decree would allow AT&T to offer the Dataspeed 40/4, if it is found to be data processing for interstate purposes. While not limiting our inquiry to any specific sections of the consent decree, we wish to draw your attention to the following. It appears to us that pursuant to Section II(i) and Section V of the consent decree, AT&T is not barred from offering, through sale or lease, the Dataspeed 40/4 at the state level in those states where the device is tariffed. We understand that the Dataspeed 40/4 is presently being sold by Teletype Corporation, a wholly-owned subsidiary of the Western Electric Company. Due to the fact that the Dataspeed 40/4 is used in conjunction with AT&T's Dataphone Digital Service and its voice-grade private line service, it could also be found that Section V(g) of the consent decree would permit AT&T to market the Dataspeed 40/4 for interstate use -- whether or not it is tariffed at the interstate level — since the offering of such a device is incidental to the furnishing by AT&T of its common carrier communication services.

The Commission is presently planning to consider the Dataspeed 40/4 question in the latter part of August. We request your advice and opinion as soon as possible in what regard, if any, the above does not accord with your understanding of the consent decree or if there are other sections of the consent decree which would be relevant to this matter.

Sincerely,

Joseph A. Marino

Joseph A. Marino
Deputy Chief, Common Carrier Bureau

COMMON CARRIER BUREAU
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POLICY AND RULES DIVISION

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CHIEF, COMMON CARRIER BUREAU

UNITED STATES DEPARTMENT OF JUSTICE

WASHINGTON, D.C. 20530

Address Reply to the
Division Indicated
and Refer to Initials and Number

DIB:JCR:JLW
60-9-96-7

SEP 2 1976

Joseph A. Marino, Esquire
Deputy Chief
Common Carrier Bureau
Federal Communications Commission
Washington, D.C. 20554

Re: United States v. Western Electric Co.
et al. (Civil Action No. 17-49).

Dear Mr. Marino:

This is in response to your August 6, 1976 request that the Department of Justice provide the Federal Communications Commission with its legal opinion regarding the effect of the 1956 consent decree in the above-captioned action upon the Bell System's offering of 'Dataspeed 40/4" services to the public.

The Dataspeed 40/4, as you know, is a terminal device made by the Teletype Corporation, a subsidiary of Western Electric. It is currently in use by companies of the Bell System and is offered to the public as well. Counsel for the American Telephone & Telegraph Company have informed us that this device has been tariffed as an intrastate service offering in several States.

Earlier this year, the Chief of the Common Carrier Bureau ruled that the Dataspeed 40/4 is a data processing rather than a communications offering (FCC Mimeo 61760, March 3, 1976). Under Commission rules communications common carriers other than the Bell System generally may not offer data processing services except through separate subsidiaries. See generally GTE Service Corp. v. Federal Communications Commission, 474 F.2d 724 (2d Cir. 1973). Current FCC regulations prohibit companies of the Bell System from having a controlling or lesser interest in, or be under common control with, a separate corporate entity that furnishes data processing services to others (47 CFR Sec. 702 (c)(Oct. 1, 1975 rev.)

Data processing services as such, moreover, are not directly regulated by the Commission at present. In 1956, however, AT&T entered into an agreement that the Bell System would restrict its activities generally to offering communications services subject to public regulation. See United States v. Western Electric Co., Inc., CCH 1956 Trade Cas. Para. 68,246 (D. N.J. 1956). Hence the Bureau Chief's factual determination, the Commission's rules, and the 1956 agreement read together could mean that AT&T cannot market the Dataspeed 40/4 terminal to the general public.

At present, the Bureau Chief's determination is before the full Commission for review. In that connection, you raise basically two questions regarding the meaning of the 1956 decree. The first question, as we understand it, is whether AT&T can offer the Dataspeed 40/4 device by sale or lease at the State level in those States where it may be tariffed as an intrastate service offering. Second, you ask if the decree would permit AT&T to offer the device for interstate and/or intrastate use, whether or not it is tariffed at the Federal level, since you believe that the offering of such a device may be "incidental to" Bell's traditional business of providing common carrier communications services. The answer to both questions, in the opinion of the Department, is essentially in the negative for the following reasons.

As stated above, AT&T under the 1956 consent decree agreed in essence to restrict its service offerings to "common carrier communications services," defined in section II(i) of the judgment to mean "communications services and facilities ... the charges for which are subject to public regulation. . . ."

In the final analysis, the district court which entered the decree is responsible to determine what is or is not a "common carrier communications service." See, e.g., New Jersey Commun. Corp. v. AT&T, CCH 1968 Trade Cas. Para. 72,455 (S.D. N.Y. 1968); Application of Clark Walter & Sons, Inc., CCH Trade Cas. Para. 72,415 (D. N.J. 1968). The Department of Justice, however, has consistently been of the opinion that the fact a particular service may be tariffed at the State level standing alone does not resolve the question. Cf. North Carolina Util. Comm'n v. Federal Communications Comm'n, __F.2d__ (4th Cir. 1976), 36 P. & F. Radio Reg. 2d 1397. In order to constitute a permissible activity under the judgment, the offering must be both a communications service or facility and be subject to public regulation. See generally Hearings Before the House Judiciary Antitrust Subcommittee on the Consent Decree Program of the Department of Justice, 85th Cong., 2d Sess. at 3694 (1958) (testimony of Assistant Attorney General Hansen).

Thus we confirm the statement in our letter of June 16, 1976 to Mr. Walter R. Hinchman:

> ... Based on the decision of the Common Carrier Bureau that the Dataspeed 40/4 is a data processing service the charges for which are not subject to regulation, we conclude that the service is not "common carrier communication service" within the meaning of the Judgment in United States v. Western Electric Company et al., Civil Action No. 17-49. Thus, defendants may not engage in the business of selling or leasing such equipment, whether directly or through a subsidiary.

Section V(g) of the judgment does permit AT&T to engage in businesses or services "incidental to the furnishing ... of common carrier communications services," as your letter points out. It is the opinion of the Department of Justice, however, that this provision cannot legitimately be read as enabling the Bell System to offer data processing services and equipment to the public merely because the relevant device can be attached to telephone company facilities. The several provisions contained in section V of the decree are clearly in the nature of saving provisions intended to permit the defendants in that case to continue to engage in a variety of miscellaneous services and activities, necessary and appropriate to the internal management and operation of their primary business. To read a savings provision as essentially vitiating substantive provisions of the decree, in our opinion, would be plainly inconsistent with the purposes of those substantive provisions, which was to limit the defendants to offering communications services subject to public regulation.

It should be understood, as we stated in discussions with you and your staff that as a general matter the Department would be guided by the Commission's factual determination as to whether the Dataspeed 40/4 offering is a communications service. While this does not mean that such a determination necessarily is dispositive, the opinion set forth here is predicated upon our reading of the language of this decree, the facts that have been adduced to date, and the Bureau Chief's expert appraisal respecting the nature of this device.

I hope that this letter will serve to make the opinion of the Department on this matter clear to the Commission and other parties. In this respect, it is requested that it be associated with and made a part of the public record in this proceeding.

Sincerely,

Jonathan C. Rose

JONATHAN C. ROSE
Deputy Assistant Attorney General
Antitrust Division

FCC 76-1199

43664

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of)
)
AMERICAN TELEPHONE AND)
TELEGRAPH COMPANY (AT&T))
)
Revisions to Tariffs F.C.C.) Transmittal No. 12449
Nos. 260 and 267 Relating)
to Dataspeed 40 (R))

MEMORANDUM OPINION AND ORDER

Adopted: December 22, 1976 Released: January 5, 1977

By the Commission: Chairman Wiley concurring and issuing a statement; Commissioner Quello absent; Commissioner Washburn issuing a separate statement.

1. On November 18, 1975, the American Telephone and Telegraph Company (hereafter, "AT&T") filed revisions to Tariffs F.C.C. Nos. 260 and 267 offering a new service consisting, primarily, of the provision of a Dataspeed 40/4 1/ in conjunction with various transmission facilities. This is the fourth in a series of Dataspeed 40 offerings, the first of which was offered in August 1974. The new Dataspeed 40/4 was proposed for use in conjunction with 2400 and 4800 bit-per-second (bps) Dataphone Digital Service (under Tariff F.C.C. No. 267) as well as voice grade private line service (under Tariff F.C.C. No. 260).

2. International Business Machines Corporation (IBM), the Computer and Business Equipment Manufacturers Association (CBEMA) and the Computer Industries Association (CIA) filed petitions to reject and suspend or for any other appropriate relief which opposed allowing the Dataspeed 40/4 tariff to become effective. AT&T opposed these petitions and IBM and CBEMA submitted replies thereto. On March 3, 1976 the Chief, Common Carrier Bureau, acting pursuant to delegated authority, rejected the tariff revisions filed under Transmittal No. 12449 as violative of the Commission's Rules and expressed policies. AT&T subsequently filed with the Commission an application for review of the Chief, Common Carrier Bureau's decision. GTE Service Corporation 2/ and the United States Independent Telephone Association filed comments in support of AT&T's application, as did the Ad Hoc Telecommunications Committee (Ad Hoc).

1/ Dataspeed 40 is a registered trademark of AT&T.

2/ GTE Service Corporation filed on behalf of itself, and its affiliated domestic telephone companies.

CBEMA [3] and IBM each filed oppositions to AT&T's application for review, and AT&T replied thereto.

Characteristics of Teletypewriters and the Dataspeed 40/4

3. Communications common carriers, such as AT&T, provide communications services which may or may not include terminal equipment. Within this context AT&T historically has provided two basic types of terminals: voice terminals (telephone instruments) and teletypewriter terminals. [4]

4. Voice terminals (telephone instruments) convert sound into electrical "analogs" for instantaneous transmission over the telephone network, and then reconvert these analog signals to sound waves at the receiving site. Teletypewriters, on the other hand, generate discrete patterns of on-off electrical impulses, each of which is designed to represent a particular character of the alphabet or a particular number or symbol. The selection of a particular pattern to be transmitted is made by depression of the corresponding teletypewriter key, or by special sensing circuits which "read" patterns of holes punched in a paper tape. Thus, by simply typing a message on the teletypewriter keyboard or inserting a pre-punched paper tape, [5] the sending party is able to transmit over the communications network a sequence of "digital" signals representing a particular textual message. At the receiving location, a similar teletypewriter employs the sequence of electrical signals received to activate the typewriter keyboard (or a paper punch) and thus reconstruct in either typewriter or punched paper form the original message text. As with voice terminals the messages are transmitted and received essentially instantaneously and as entered by the sender.

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[3] CBEMA filed a Petition for Limited Review which generally supported the action taken by the Chief, Common Carrier Bureau. However, it argued that the Chief improperly determined that AT&T's 61.38 data was sufficient. Therefore CBEMA seeks review based on the 61.38 determination only if the Commission were to reverse the Chief's decision.

[4] These typewriter terminals are called Teletype (R) devices by AT&T; Teletype is a registered trademark of AT&T.

[5] Through the use of pre-punched paper tapes the operator of a teletypewriter had the ability, albeit awkward, to store and edit messages. (See paragraph 9)

5. Teletypewriters operate in the asynchronous mode, a method whereby individual characters can be initiated at any arbitrary time (as by the stroke of a finger at the keyboard) and at any character rate, provided that the maximum capability of the device or communications channel is not exceeded. In modern teletypewriters this maximum is about 10 characters per second, or 100 words per minute. These speeds are compatible with human reaction times in operating these instruments.

6. AT&T's typewriter terminals were originally designed for communications where a written record of the communications was desired. Thus, AT&T originally offered its Teletype devices for use in conjunction with teletypewriter exchange service (TWX) and private line service. However, with the development of computers and data processing, a market application of the teletypewriter design emerged. The eletrical signals which communicate with a teletypewriter are digital, and thus are compatible with the electrical signals used by computers and data processing equipment. AT&T's customers perceived this, and began to lease Teletype devices for use as input and output devices for computers. In addition, the Teletype Corporation [6] has sold Teletype devices directly to computer manufacturers for inclusion in the data processing systems which they assemble. As time went on, the usage of Teletype devices shifted from applications only devoted to record communications to applications concerned also with computer input/output functions. This changed usage pattern did not change the essential character of the devices themselves.

7. The Dataspeed 40/4, is one of a new class of "smart" remote access devices [7] designed specifically to interface with a host computer data processing system. If it were required to communicate with another Dataspeed 40/4, it could do so only through a host computer and under computer control. The Dataspeed 40/4 was designed as a competitive alternative to other "smart" remote access devices developed by independent equipment suppliers.

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[6] Teletype Corporation is a wholly-owned subsidiary of the Western Electric Company which is, in turn, wholly-owned by AT&T.

[7] To refer to the Dataspeed 40/4 and similar devices as merely a "terminal" is somewhat misleading. If a remote computer is used to access a host computer the remote computer could be referred to as a terminal. On the other hand, the basic telephone is also included within the terminal category. In order to be more specific, therefore, we refer to devices used to access a host computer as "remote access devices."

8. The Dataspeed 40/4 operates in the following manner: messages which are either typed or read into the Dataspeed 40/4 via the typewriter keyboard or other means are stored, in sequence, in an internal memory unit. Prior to transmission over any external communications network, these messages may be recalled from memory for display on a cathode ray tube (CRT). Any errors perceived in the message may be corrected by the operator, or any other alterations made, before the message is reentered into the memory unit. When the operator is satisfied with the message content and format, a "ready" signal is sent over the communications line to the remote computer. When the computer is ready to receive the message, it "orders" the Dataspeed 40/4 to transmit what is contained in its memory and establishes the precisely timed interval in which the message elements are sent, a process described as "synchronous" 8/ as opposed to "asynchronous" or random transmission. The computer alerts the designated remote access device by sending a special character sequence. Timing mechanisms, or "clocks" are precisely synchronized at both ends of the communications link. The computer data are then transmitted, in the synchronous mode, to a memory in the remote access device, which is capable of storing as many as three "pages" of data -- where each page represents one complete screen-occupying display. The remote access device memory implements two distinct functions, each of which results in the more efficient utilization of both the computer and the communications link. The three page capacity allows the remote device to query and peruse a relatively large amount of stored data without further interaction with the host computer. Additionally, local memory permits the CRT display to be "refreshed" locally rather than by the host computer. 9/

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8 / In the synchronous digital mode, individual characters are grouped together in multicharacter strings and sent at one invariant rate. Synchronous transmission is particularly suited for efficient computer interaction. Additionally, when compared to asynchronous transmission, synchronous techniques permit higher transmission rates to be achieved for a given channel bandwidth.

9 / The flourescent screen of a CRT does not retain an image indefinitely. Accordingly, the characters comprising a given display must repeatedly be transmitted to the screen in order to generate a continuingly readable display. The memory serves the function of storing these characters locally. Without the memory it would be necessary continuously to transmit the display, refreshing characters from the host computer to the remote access device -- resulting in an inefficient use of both computer capacity and communications capacity.

9. In one of its frequent applications, the Dataspeed 40/4 is used to edit text before it is transmitted to the host computer, using text editing functions more sophisticated than those available from a conventional teleprinter/communications link. Conventional teletypewriters also gave operators text editing capability. Text editing could be accomplished by having the operator first prepare a punched paper tape representing the message to be transmitted, which can be manually corrected to a limited extent. If an error is detected the tape can be backspaced and the "rubout" key used to strike over the erroneous character. When the tape is eventually transmitted to the host, the tape transmitter ignores the blanked out character and transmits the next character without leaving a space in the text.

10. When the Dataspeed 40/4 is used, the operator can view the results of his typing on the CRT display prior to transmission. Keystroke errors and omissions can be corrected by moving an operator-controlled cursor to the appropriate point in the text. Text ranging from a single to several lines can be deleted and the text contained in the memory will be made automatically to fill in the gap created by the deletion, and the resultant edited text will be displayed on the CRT. Or, several omitted characters can be inserted into the middle of a line, and the Dataspeed 40/4 will automatically correct the text to accomodate the newly entered characters. In either case the resultant edited text will be stored in the local memory until the editing function is completed. It will then be transmitted to the host computer in one burst -- free of operator errors.

Decision Below

11. IBM, CBEMA and CIA had originally petitioned for rejection of the Dataspeed 40/4 tariff revisions on the ground that this service constitutes the offering of data processing service, as opposed to communications service, and under the policies and rules adopted by the Commission in its Docket No. 16979 Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities 10/ inquiry (hereafter, "Computer Inquiry"), AT&T is barred from providing the Dataspeed 40/4 service except through an affiliated subsidiary. The Chief of the Common Carrier Bureau, acting pursuant to delegated authority under Section 0.291 of our Rules and Regulations, concluded that the Dataspeed 40/4 offering was an offering of data processing service. Accordingly, the Chief of the Common Carrier Bureau rejected Transmittal No. 12449 as patently violative of our policies and rules.

10/ 28 FCC 2d 291 (1970); 28 FCC 2d 267 (1971); Aff'd in part sub. nom. GTE Service Corp. v. F.C.C., 474 F.2d 724 (2nd Cir., 1973).

12. The Chief of the Common Carrier Bureau looking at the Dataspeed 40/4's technical characteristics and its intended use concluded that the Dataspeed 40/4 was inextricably interwined with a central computer for its operation, and was intended and marketed solely for usage with a central computer's data processing functions. Based on the conclusion that the Dataspeed 40/4 was designed for, and was intended to be marketed in, the competitive data processing market, the Chief concluded that the Dataspeed 40/4 service offering was inconsistent with both the rule and policies established in the Computer Inquiry and was unlawful on its face. Moreover, in distinguishing that class of equipment which is designed and marketed for terminal-to-terminal message exchange, such as the basic telephone, KTS, PBX, teletypewriters, and facsimile terminals, the Chief concluded that the Dataspeed 40/4 falls into that class of equipment which is designed to be used and marketed solely for the input, output, formatting, and conversion of computer-based data and which is not generally intended for basic terminal-to-terminal message transmission. The Chief concluded that this type of equipment is intended instead for either on-site or remote-access interaction with a central computer and/or processing unit, and thus inherently constitutes a data processing service.

13. In addition, CBEMA filed a petition for rejection or suspension of the Dataspeed 40/4 tariff revisions on the independent ground that the filing was not in compliance with Section 61.38 of our Rules. The Chief, Common Carrier Bureau, determined that the material which was filed was not in violation of Section 61.38, at least with respect to rejection of the filing. The Chief's decision is silent with regard to whether Section 61.38 has been complied with with respect to more than a *prima facie* showing of acceptableness for filing with the Commission of the Transmittal.

Petitions on Review

14. AT&T in its Application for Review, (hereafter, "Application") asserts that the Chief's order effectively removes AT&T as a provider of data terminal services, whenever customers wish to update their service in order to communicate more efficiently with a computer without the need for an intervening operator. It further contends that since the Computer Inquiry rules do not permit AT&T to provide data processing, AT&T would thus be limited essentially to providing only wires. AT&T contends that the Dataspeed 40/4 service is a communications service, and that the Dataspeed 40/4 is simply a high speed teletypewriter terminal which, like the lower speed teletypewriter devices, "provides customers with the capability of entering, displaying, editing, printing, transmitting and receiving data between two or more locations over a direct communications path." 11/ Thus it contends that the communications functions which are performed by the Dataspeed 40/4 offerings are identical to those which have always been performed by teletypewriters.

11/ Application P. 7.

15. AT&T argues that the functions performed by the Dataspeed 40/4 service are clearly communications since the informational content of the message transmitted is (a) controlled by the customer and (b) not altered in transmission by the carrier. AT&T proffers the Commission's definition of "message switching" to support the proposition that Dataspeed 40/4 is merely a communications service. 12/

16. At the same time AT&T utilizes our definition of data processing to conclude that the Dataspeed 40/4 offering is not a data processing offering since, by definition, message switching is not data processing. 13/ AT&T contends that the Chief extended the Commission's concept of prohibited "data processing" in that the Chief concluded that the Commission had ruled only that carriers could not provide end-to-end data processing services, but then proceeded to conclude that this also prohibited the furnishing of discrete items of terminal equipment. It submits that the rule and policies enunciated in the Computer Inquiry provide no support for the Chief's interpretation and that the Chief ignores the distinction between the functional characteristics of the Dataspeed 40/4 and the end-to-end service concept as stated in the Computer Inquiry. AT&T asserts that the Chief chooses instead to rely on whether the equipment is designed to communicate with computers. Finally, AT&T asserts that the premise of the Computer Inquiry derived maximum separation policy -- avoidance of unidentifiable cross-subsidies from monopoly ratepayers to competitive data processing services -- is inapplicable to the Dataspeed 40/4 offering. It contends that the Commission has investigatory hearing and prescription tools available to ensure that there is no cross-subsidy.

12/ Section 64.702(a)(2) provides that:

> "message-switching" is the computer controlled transmission of messages, between two or more points, via communications facilities, wherein the content of the message remains unaltered.

13/ Section 64.702(a)(1) provides that:

> "Data processing" is the use of a computer for the processing of information as distinguished from circuit or message switching. "Processing" involves the use of the computer for operations which include, _inter alia_, the functions of storing, retrieving, sorting, merging, and calculating data, according to programmed instructions.

17. IBM takes the position that when the computer's functions are moved from the computer to a remote access device, as has been the case of the Dataspeed 40/4 as compared with predecessor teletypewriter devices, the data processing functions so moved do not become communications functions merely by location in the remote access device. IBM contends the Dataspeed 40/4 is not transformed from a communications device to a data processing device because certain features are now automated, as compared with the predecessor communications device; rather, it is transformed from a communications device to a data processing device because it now incorporates data processing functions previously contained in the computer to which the predecessor teletypewriter communicated.

18. In essence, then, IBM deems the Dataspeed 40/4 offering the offering of data processing service because the device has assumed functions which previously were part of central data processing equipment. AT&T, in contrast, deems the Dataspeed 40/4 offering an offering of communications service because it automated functions which previously were performed, however awkwardly, by the predecessor Teletype devices, which, according to AT&T were inarguably communications devices within the contemplation of the Computer Inquiry. Finally, the Chief of the Common Carrier Bureau considers the Dataspeed 40/4 offering an offering of data processing service not only because it incorporates certain data processing functions previously handled by a central computer but also because it is incapable of the traditional record communication functions of the predecessor Teletype devices and was neither intended nor marketed for such record communication uses.

Discussion

19. Our Computer Inquiry was initiated in 1966 to provide a public forum for the examination, discussion and resolution of a number of regulatory and policy questions that appeared to be emerging from the growing interdependence of computers and communications services and facilities. Following the submission of approximately 3000 pages of comments from sixty parties, the Commission issued its Tentative and Final Decisions in which it enunciated certain basic policies, and in which it promulgated Section 64.702 of the Rules. 14/

14/ 47 C.F.R. Section 64.702. The rule, in addition to setting forth certain definitions, in-essence, requires communications common carriers which wish to offer data processing services to operate on the principle of maximum separation of their unregulated data processing operation from the regulated carrier services through establishment of a separate, data processing subsidiary which deals at arms length with the common carrier business entity, and which maintains separate books of account.

20. The maximum separation policy was one such policy. A consideration in the formulation of such a policy was the determination that data processing is a non-monopoly competitive market. We were concerned that were common carriers to compete without restriction in the competitive data processing market, because of the possible commingling of costs between regulated communication services which carriers would provide in conjunction with data processing, and the data processing services themselves, it would be difficult for the Commission to determine whether, and if so by how much, the competitive data processing services would be subsidized by revenues derived from communication services. 15/ The Commission, in adopting Section 64.702 of the Rules, fashioned an appropriate remedy for this concern in that it required common carriers which wished to provide data processing services to provide such data processing services through a separate subsidiary, and to deal at arms length with that subsidiary as a common carrier customer.

21. At the time the Computer Inquiry decision was reached, in 1971, the majority of data processing applications were implemented by large scale general purpose computers at centralized locations. Terminal devices were substantially similar to the then existing teletypewriter devices. 16/ In 1971, remote access data processing was typically performed as follows: The teletypewriters, and their equivalents, communicated with the computer. The computer then performed any and all manipulations upon any entered data or commands in accordance with the manner in which the user had programmed the computer to perform. 17/ Finally, the results of such manipulations were transmitted to and received and printed out by the same, or another teletypewriter. In those cases where the teletypewriter's message, or data stream, was merely stored by the computer, not changed in content, and ultimately relayed to another teletypewriter device, we regarded this as a communications function -- store and forward, or message switching.

15/ 28 FCC 2d 291, 298-303.

16/ See Paragraphs 3-5, *supra*.

17/ E.g., arithmetic and logical operations, sorting operations, formating and re-formating operations, storage, and combinations thereof.

22. In the ensuing five years technology has advanced to the point that circuitry which was formerly considered by some to be purely "computer" circuitry is increasingly used for other functions. 18/ Functions which previously were implemented solely within the computer, are increasingly being built into the remote access device. In 1971, some text editing was performed by, and under the control of the host computer central processing unit (CPU). Today, many of these editing functions can be removed from the computer and incorporated into the remote access device -- by using relatively inexpensive solid state read-only memories (ROMS) and random access memories (RAMS) in conjunction with associated microprocessor control logic. Thus, a typist at such a modern-day device can insert a missing word locally, and the remote CPU will not in any way be involved until the remotely edited text is entered into the host processor.

23. A teletypewriter has been traditionally considered to be a communications device. If all of the data processing functions performed by the computer are now moved into a remote access device, the remote access device in essence becomes a data processing device. If only some of these functions performed by the computer are moved into the remote device, or some functions are enhanced, does the device become a data processing device, or is it a communications device? This is the question posed by the Dataspeed 40/4.

24. The Bureau Chief's application of the Computer Inquiry decision in rejecting the tariff revision is based on the assumption that the Dataspeed 40/4 becomes a data processing device simply because it possesses some data processing capabilities and is intended and marketed solely for usage with a central computer. 19/ While there

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18/ In particular, the development of the microprocessor has led to the circumstance where such devices can be produced on a production line basis as essentially identical units, and at dramatically low costs. These extremely compact devices can then be adapted to any specific application by the addition of a unique program of coded instructions which is stored in an ancillary read-only memory (ROM). Thus microprocessors can be programmed to perform: (a) traditional computer data processing functions (as in today's pocket calculators) or (b) various control, logic, and buffering functions which were previously performed by hard-wired arrays of discrete components.

19/ AT&T questions the authority of the Bureau Chief to reject a proposed tariff revision pursuant to delegated authority. In this regard we note that while Section 0.291 withholds authority from the Bureau Chief to suspend a tariff, it does not prevent the Bureau Chief from rejecting a tariff, on the ground that it is prima facie unlawful as being in violation of a Commission Rule or Regulation.

is a close and intimate relationship between data processing and communications services and this interdependence continues to increase, it is not proper to conclude that because this interdependence exists, anything related to the data processing service becomes data processing. The particular service being offered must provide the framework for determining the nature of the service.

25. It is important to keep in mind what AT&T is proposing to offer. Pursuant to its proposed tariff revision, AT&T seeks to offer a service which consists of a Dataspeed 40/4 in conjunction with an interstate private line communications channel. The computer to which the Dataspeed 40/4 is linked by means of the communications channel is neither provided by nor under the control of AT&T. We agree with the Bureau Chief that the interconnection with a computer is essential to the functioning of the Dataspeed 40/4, and that the computer to which it is connected does data processing. However, a crucial and distinguishing factor which limits the applicability of Section 64.702 and the maximum separation policy to the Dataspeed 40/4 offering is the fact that AT&T is not providing and does not propose to offer the data processing operations of the central computer which render the Dataspeed 40/4 functional. The maximum separation policy was directed to the provision and utilization of central host computers by communications common carriers in the offering of their data processing services. If AT&T, as a common carrier, offered as a part of the Dataspeed 40/4 service the data processing capabilities of the central computer, the maximum separation policy would apply. However, under our rules as they currently exist, it would be inappropriate to attribute to the Dataspeed 40/4, as IBM would have us do, the data processing functions of the non-AT&T provided or controlled computer in determining the tariffability of the Dataspeed 40/4 service offering.

26. AT&T's Dataspeed 40/4 tariff revision is structured in such a manner that it does not come within the scope of Section 64.702. AT&T's Dataspeed 40/4 offering therefore cannot be held to be inconsistent with Section 64.702. The original Computer Inquiry, from which Section 64.702 evolved, did not address the question of data processing elements being removed from the central computer and distributed among various components within the particular service offering. In 1971 data processing was performed solely by the central host computer and Section 64.702 applied to utilization of such computers by regulated common carriers in the provision of their data processing services. The immediate issue before the Commission at that time concerned the various applications which might be made of central computers, and the proper

role and regulation of common carriers with respect to these different uses. The role of remote access devices in the overall data processing service was considerably less significant than that of the central computer to such an extent that Section 64.702 merely addresses the role of the central computer in providing data processing and communications services, and does not address the distribution of data processing among devices other than the central computer. We disagree with the Bureau Chief's determination that because the Dataspeed 40/4 offering is inextricably intertwined with a central computer for its operation, and is intended and marketed solely for usage with a central computer's data processing functions, it is therefore inconsistent with the rule and policies established in the Computer Inquiry and unlawful on its face.

27. Having determined that the Dataspeed 40/4 offering does not fall within the scope of Section 64.702, we are left with deciding the Dataspeed 40/4 tariff revision separate and apart from Section 64.702. In order to determine whether the offering of the Dataspeed 40/4 by AT&T is a communications or data processing service, it is necessary to analyze the specific service which it provides. Contrary to the Bureau Chief's position, the characteristics of the Dataspeed 40/4 service offering must be considered separate from the characteristics of the central computer.. Upon analyzing the characteristics of the Dataspeed 40/4 service, we conclude that it is similar in kind, but not in degree, to that provided by established communications devices -- devices utilized to transmit input data to a computer and to serve as the terminus for the processed output data transmitted from the computer.

28. The Dataspeed 40/4 performs certain data processing functions which serve to streamline or otherwise improve the operator's ability to input, edit, and display information which is to be or has been processed by the central computer. It incorporates certain capabilities which permit efficient utilization of the private line communications channel over which the data is transmitted. The editing function, for instance, enables the operator to make any addition or correction to the inputted data prior to transmission.20/ The operator directs the space locator to the proper location and makes the appropriate additions or deletions with the final version automatically appearing on the screen.

29. The functions of the Dataspeed 40/4 most analogous to traditional data processing functions are the storage and buffering capabilities. The Dataspeed 40/4 has the capacity to store up to 72 lines of information. This storage function makes possible the "off-line" preparation of the message and furthermore enables the operator to

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20/ This is of course a much more efficient manner of editing than the teletypewriter permits.

transmit a message that is free from operator errors. This capability merely allows the data to be collected and retained until all the input data are entered. Storage capability is also necessary for CRT display generation and synchronous high speed transmission -- a mode which enables more efficient utilization of the communications channel.

30. In analyzing the characteristics of the Dataspeed 40/4 service, we find that it represents a combination of both communications and data processing. The existence of data processing characteristics in the service offering, however, does not lead to the conclusion that the service is primarily a data processing rather than a communications service. The data processing functions as utilized in the Dataspeed 40/4 device unquestionably result in the more efficient utilization of the communications channel which links the remote access device to the central computer. Nevertheless, a data processing service is not being offered. What is being offered is a communications service wherein minimal data processing functions are incorporated into the device in order to facilitate the efficient transmission of data over the communications link. And such a result, efficiency in communication service, is, of course, a cardinal principle of our statutory mandate (47 U.S.C. §151) as long as there are no contervailing public interest factors.

31. By incorporating additional data processing-type functions a point is reached beyond which a service patterned after the Dataspeed 40/4 offering would, in all reality, constitute data processing. It is possible for many combinations and permutations of processing functions to be offered in connection with communications and data processing services. Incorporation of these functions is limited only by technology and technical expertise. While the technologies employed in either communications or data processing activities may be virtually indistinguishable, we have taken the position in our existing Computer rules that the *services* which can be rendered by the utilization of these technologies can, in most instances, be identified as being either data processing or communications. The nature of the technology being what it is, however, we are not so presumptuous as to view our analysis of this offering as an all-encompassing one which can readily be applied to future offerings. The fact of the matter is that data processing technology has advanced since our *Final Decision* in 1971 resulting in various data processing functions of the host computer being distributed among peripheral devices. To the extent that our Rules have not kept pace with these changes, they need to be re-examined.

32. We have already initiated a Notice of Inquiry and Proposed Rulemaking pertaining to the definitional structure set forth in Section 64.702. 21/ The scope of that proceeding is, however, limited to defining the role of a computer in the provision of a communications or data processing service. The problems raised by peripheral devices performing data processing functions in conjunction with a computer were not addressed. In view of the inadequacy of our rules as they pertain to services such as the Dataspeed 40/4 offering, we believe that it would be appropriate at this time to enlarge the scope of Docket No. 20828 to include issues raised by a carrier's provision of peripheral devices which might be considered data processing activities to determine whether this results in the offering of a communications or a data processing service. We believe that the public interest would best be served by adopting policies and rules of general applicability governing such common carrier offerings. 22/

33. Accordingly, our decision herein must necessarily be limited in its applicability to the revisions as stated in the pages accompanying Transmittal No. 12449. The analysis and rationale used herein may not be given any broader application than the factual situation presented by the Dataspeed 40/4 offering. It should be made clear that we consider the Dataspeed 40/4 offering as one which approaches the borderline between communications and data processing. A further variation in the functions performed by the Dataspeed 40/4 might alter the nature of the service being offered. Our decision herein is subject to any subsequent determination made by the Commission in the new Computer Inquiry (Docket No. 20828).

34. Because of our concerns expressed in paragraph 33 AT&T must provide us with continuing information on any changes to the Dataspeed 40/4 offering including engineering, design, marketing, or service changes. We shall also require that AT&T file with the Common Carrier Bureau all Bell System Practices relating to the Dataspeed 40/4 equipment or service and subsequent offerings, as well as all modifications and additions to such Bell System Practices, and all General Letters, Engineering Letters, advertisements, and other Bell publications announcing modifications or additions to the Dataspeed 40/4 features.

21/ Notice of Inquiry and Proposed Rulemaking, FCC 76-745, released August 9, 1976 (Docket 20828).

22/ F.C.C. v. Storer Broadcasting, 351 U.S. 192 (1956); California Citizens Band Association v. U.S., 375 F.2d 43 (9th Cir., 1967), cert. denied, 389 U.S. 844 (1967); WBEN, Inc. v. U.S., 396 F.2d 601 (2d Cir. 1968).

35. A further question arises whether the supporting material accompanying the proposed tariff revision is sufficient to withstand the challenge of rejection. CBEMA filed a Petition for Limited Review seeking a rejection or suspension of the proposed tariff revision on the grounds that AT&T failed to comply with Section 61.38 of the Commission's Rules and Regulations. CBEMA argues that the Bureau's decision inadequately considered its arguments and that it is entitled, as a matter of law, to a more reasoned consideration of its arguments prior to the effectiveness of the proposed tariff revision. CBEMA's concern is that the developmental, manufacturing, service and promotional costs associated with the Dataspeed 40/4 may not have been properly allocated such that the offering of the Dataspeed 40/4 service may, in fact, be subsidized by other regulated and monopoly communication services. In addition CBEMA points to alleged inconsistencies in the Bureau Chief's order regarding the sufficiency of the 61.38 data.

36. Even assuming any inconsistencies existed in the Bureau Chief's order, they are now rendered moot by our reversal. The concerns which CBEMA raises in its petition address problems which are beyond the scope of Section 61.38. The Bureau Chief concluded that the tariff revision and the supporting material submitted with it was sufficient on its face to withstand rejection on the basis of Section 61.38. We have reviewed the supporting material and agree with the Bureau Chief that no _prima facie_ showing of unlawfulness has been made which would merit rejection. AT&T has substantially complied with the requirements of Section 61.38 and has clearly complied with the specific components thereof in terms of the economic data submitted, justification for the filing, and the basis for the rates selected. Section 61.38 has been applied to the Dataspeed 40/4 offering in a manner consistent with previous Commission determinations. We shall deny CBEMA's petition. Accordingly no basis for rejection exists.

37. For the reasons heretofore given, we reverse the decision of the Chief, Common Carrier Bureau that the offering of the Dataspeed 40/4 service by AT&T constitutes the offering of a data processing service in violation of the Commission's Rules and expressed policies. 23/

23/ This decision is, of course, subject to any further determination made in our new computer inquiry (Docket No. 20828).

38. Accordingly, IT IS ORDERED, that the Application for Review filed by American Telephone and Telegraph Company IS GRANTED. AT&T may therefore refile the tariff revisions accompanying Transmittal No. 12449 to be effective on not less than fourteen day's notice from the date of release of this order.

39. IT IS FURTHER ORDERED that the Petition for Limited Review filed by the Computer and Business Equipment Manufacturers Association IS DENIED.

40. IT IS FURTHER ORDERED that the request of the International Business Machines Corporation that the Commission set this matter for oral argument IS DENIED.

FEDERAL COMMUNICATIONS COMMISSION *

Vincent J. Mullins
Secretary

*See attached statements of Commissioners Wiley, Chairman; and Washburn.

Concurring Statement of Chairman Richard E. Wiley in re the Dataspeed 40/4 Case

Today's Dataspeed 40/4 decision reflects the increasingly difficult nature of Commission efforts to neatly categorize data communications terminals as either communications equipment or data processing devices. A readily discernible line between those two terminal functions may simply no longer exist in light of the increasing interdependence of communications and data processing.

My initial and tentative inclination was to view the Dataspeed 40/4's storage, retrieval, merging, sorting, and calculating capabilities as tantamount to stand alone data processing capabilities which would require a conclusion that it is a data processing unit. However, my initial judgment has been tempered by a recognition that the original Computer Inquiry did not purport to prescribe rules and definitions for terminals, and by a concern that rigid application by analogy of those rules to terminals might result in denying communications options and alternatives to consumers. This latter concern is particularly significant given the effect of the 1956 Consent Decree on AT&T's ability to offer data terminals -- another matter not adequately addressed in the original Computer Inquiry.

The case is obviously a close one. Sound arguments can be advanced in support of either proposition. Under such circumstances, it is neither surprising nor inappropriate that the Commission would consider the practical consequences for consumers if they are denied access to desired equipment.

Notwithstanding these considerations, I nonetheless would have considerable difficulty in concurring in my colleagues' conclusions that the Dataspeed 40/4 is a communications terminal if I thought this was but the first in a long line of ad hoc judgments on the road to addressing the real issues raised by data terminals. This is, of course, not going to be the case. At my suggestion, the Commission is preparing to enlarge its pending revisitation of the Computer Inquiry to squarely address the fundamental problems posed by the trend towards distributed data processing and the integration of communications and processing functions in a single device. I would expect that our expanded Computer Inquiry would enable us to resolve such issues as: (1) To what degree, if at all, should data terminals be regulated? (2) What safeguards would be necessary to protect consumers and prevent predatory practices if common carriers offered data terminals on an untariffed or unregulated basis? (3) Does the 1956 Consent Decree enhance or retard competition in this facet of the communications equipment market? (4) What state regulatory provisions, industry practices, and Congressional mandates should the Commission take cognizance of in exploring any possible rules for data terminal equipment?

Since the resolution of these (and other) questions in a rulemaking context should insure that future decisions are based on soundly formulated rules rather than a never ending series of individual judgments, our action today is inevitably subject to the outcome of the overall inquiry and rulemaking. Thus, this decision should be viewed as a conclusion of transitory import. In light of all the circumstances I have enumerated, I find myself able to concur in the Commission's decision with respect to the Dataspeed 40/4 terminal.

January 5, 1977

SEPARATE STATEMENT OF COMMISSIONER ABBOTT WASHBURN
RE: ACTION GRANTING AT&T'S DATASPEED 40/4 TARIFF OFFERING

The Common Carrier Bureau propounds the riddle: "When is a communications device not a communications device but a computer?" And gives the answer: "When it is a 'smart' terminal."

In its Order released today, however, the Commission found that AT&T's Dataspeed 40/4 is not "smart" enough, nor adequate to stand alone as a computer.

There are certain attributes common to both computers and communicating devices. For example, the movement of data (unquestionably the prime characteristic of a communications device) takes place within the mechanism of a computer. But this does not turn the computer into a communications device. Storage of data (unquestionably a function of computers) takes place in the use of certain communications devices, e.g. teletype machines with punch-tapes. But this does not turn teletype machines into computers.

As one discussant put it: "You can cut grass with nail scissors, but that doesn't make them a power-mower."

The Order, also, directs that our Computer Inquiry, Docket 20828, be expanded to include consideration of "smart" terminals offered by carriers. Hopefully, at the end of the Inquiry we will have a clearer definition (taking into account latest technological advances) of the basic distinguishing characteristics of both data processing machines and terminal communications devices. This will be of significant help to the Commission in judging future tariff offerings in this area.

The Commission is not now persuaded that Dataspeed 40/4 incorporates functions which are essentially and peculiarly those belonging to computers.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FCC 77-56
43970

In the Matter of

AMERICAN TELEPHONE AND
TELEGRAPH COMPANY (AT&T)

Revisions to Tariffs F.C.C.
Nos. 260 and 267 Relating
to Dataspeed 40/4$^{(R)}$

Transmittal No. 12449

MEMORANDUM OPINION AND ORDER

Adopted: January 18, 1977 Released: January 25, 1977

By the Commission: Commissioner Lee absent

1. Under consideration is a Motion for Stay filed on January 12, 1977 by the Computer and Communications Industry Association (CCIA) pursuant to Sections 1.43 and 1.44 of the Commission's Rules. CCIA requests the Commission to stay the effectiveness of its Dataspeed 40/4 Decision 1/ (ORDER), pending the outcome of the Commission's recently initiated Computer Inquiry (Docket No. 20828), or, in the alternative, for a stay of the Order "pending an appeal to the U.S. Court of Appeals for the District of Columbia Circuit." 2/

2. A fourfold showing is required before a grant of a request for a stay is warranted. Petitioner must demonstrate: (1) a likelihood of success on the merits taken on appeal; (2) that failure to grant a stay would lead to irreparable injury to the petitioner; (3) that granting of the stay would not harm other interested parties; and (4) that granting of a stay would be in the public interest.

1/ Memorandum Opinion and Order (FCC 76-1199), released January 5, 1977.

2/ In the Order AT&T was permitted to refile its tariff revision to be effective on not less than fourteen days notice from the date of release of the Order. Due to the short notice period and the fact that this motion was not filed until seven days after release of the Order, we are acting on this motion prior to the expiration of the comment period permitted under Section 1.45 of our Rules.

Virginia Petroleum Jobbers Association v. *FPC*, 259 F.2d 921 (D.C. Cir. 1958). As measured against this fourfold showing, CCIA has not demonstrated that a stay of the Commission's *Order* is warranted.

3. CCIA asserts that it has a likelihood of successful appeal on the merits because the Commission violated its own rules, misinterpreted the scope of the original Computer Inquiry 3/ (Docket 16979), and rendered an arbitrary decision which affects, and is contingent upon, a docket already in progress. 4/ CCIA asserts that the Commission's decision that the Dataspeed 40/4 offering is a communications service is based on the finding that the Dataspeed 40/4 must be connected to a computer to operate properly. Moreover, it asserts that the Commission failed to make a determination as to whether this service is a hybrid communication or hybrid data processing service and also failed to conclude that Transmittal 12449 was not filed in accordance with the specific notice requirements of Section 64.702(e) of the Commission's Rules, dealing with such hybrid offerings.

4. CCIA submits that the Commission erroneously determined that Section 64.702 does not address the distribution of data processing among devices other than the central computer. It maintains that the Commission in the original Computer Inquiry created a regulatory environment which would coexist with future technological developments, including the Dataspeed 40/4, when it determined that guidelines for the industry and the formulation of general principles could best be accomplished by review and evaluation on an *ad hoc* basis of factual situations as they develop. Furthermore, CCIA refers to our definition of "Remote Data Processing Service" 5/ and notes that, since neither "computer" nor "customer terminal" are defined, the Commission misreads its own rules in determining that Section 64.702 does not "address the distribution of data processing among devices other than the central computer." Moreover, in making the *Order* subject to any determination made in the new Computer Inquiry, it asserts that Dataspeed 40/4 Order will prematurely bias at least one of the relevant issues in that proceeding.

3/ *Final Decision and Order*, 28 FCC 2d 267 (1971).

4/ *See* *Notice of Inquiry and Proposed Rulemaking*, released August 9, 1976, 61 FCC 2d 103 (Docket No. 20828).

5/ Section 64.702(a)(4): "Remote Access Data Processing Service" is an offering of data processing wherein communications facilities, linking a central computer to remote customer terminals, provide a vehicle for the transmission of data between such computer and customer terminals.

5. CCIA states that failure to render a stay will cause irreparable injury to CCIA's members on the basis that all revenues accruing to AT&T, due to its marketing of the Dataspeed 40/4 during the pendency of the new Computer Inquiry, will be revenues forever lost to CCIA member companies and other competitors against whom the Dataspeed 40/4 will compete. Moreover, it contends that a significant loss of revenues by some of these companies may force them out of business. On the other hand, it submits that grant of a stay will not irreparably injure AT&T since that Dataspeed 40/4 is just one small product line, the loss of revenues from which would have no measureable effect on the corporation as a whole.

6. CCIA asserts that the grant of a stay will serve the public interest. It submits that it is appropriate to look to the public interest concerns that the Commission sought to achieve during the original Computer Inquiry to determine if they are in accord with the Dataspeed 40/4 decision. It then proceeds to conclude that the Commission's Dataspeed 40/4 Decision will result in the creation of an environment wherein the abusive practices which the Commission sought to prevent in the original Computer Inquiry might flourish.

Discussion

7. Numerous arguments are set forth by CCIA to support the proposition that the Dataspeed 40/4 Order is sufficiently deficient that a reversal by the Court on appeal is likely. We find no merit to these arguments. CCIA is incorrect when it states that our decision is based on the finding that the Dataspeed 40/4 must be connected to a computer in order to be functional. Exactly what CCIA means by this statement is unclear. Our purpose in stating that the interconnection with a computer is essential to the functioning of the Dataspeed 40/4 6/, was to determine the applicability of Section 64.702 to the Dataspeed 40/4. The original Computer Inquiry from which Section 64.702 evolved addressed the situation where a carrier provided the processing capabilities of a computer as part of its service offering. Even though the Dataspeed 40/4 depends on the processing capabilities of a computer for its utility, AT&T is not providing the computer or its capabilities as part of its Dataspeed 40/4 service offering. Rather, AT&T is merely providing the Dataspeed 40/4 in conjunction with a communications link. Section 64.702 never addressed nor has it been interpreted to apply to carrier offerings where the processing capabilities of the carrier's computer are not offered as part of the service offering. Moreover, our definition of "Remote Data

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6/ Memorandum Opinion and Order, 76-1199, para. 25.

Processing Service", as applied to the Dataspeed 40/4 offering, is irrelevant since the definition, in essence, involves the offering of data processing. We have determined that the Dataspeed 40/4 offering constitutes a communications service and have specifically stated that a data processing service is not being offered. 7/ Accordingly, these arguments can hardly support the contention that we have misinterpreted the reach of the original Computer Inquiry and Section 64.702.

8. In analyzing the characteristics of the Dataspeed 40/4 service we found that it represented a combination of both communications and data processing. CCIA asserts that because of this finding we were required under our rules to make a determination as to whether the service was a hybrid communications or a hybrid data processing service, and not having done so we are in clear violation of our own rules. This argument might have merit if the Dataspeed 40/4 constituted a hybrid service as defined in Section 64.702(a)(5). 8/ A hybrid service consists of a combination of remote access data processing and message switching. Not only is data processing not being offered, as has already been determined, neither is message switching. A practical message switching system consists of three elements: (a) at least two terminal devices, (b) communications lines, and (c) switching computer(s). The Dataspeed 40/4 is not capable of being combined with other like terminals in a message switching network without the agency of element (c) -- a message switching computer, which AT&T is not providing as part of its service offering. It is obvious, therefore, that the Dataspeed 40/4 offering is not a hybrid service and any determination to the contrary would be inconsistent with our rules.

9. The assertion that the Commission acted in an arbitrary fashion in finding the Dataspeed 40/4 offering to be a communications service is unfounded. Because we found that the Dataspeed 40/4 offering approached the borderline between communications and data processing, that a further variation in the functions might alter the nature of the service being offered, and that our decision is subject to any determination made in the new Computer Inquiry, CCIA asserts that our decision is arbitrary and serves to prematurely bias at least one of the relevant issues in the new Computer Inquiry. Just what that issue is, CCIA does not say. In any event, it must be kept in mind that Section 64.702 was found to be inapplicable to the Dataspeed 40/4. While we indicated that the new Computer Inquiry will attempt to deal with issues raised by the Dataspeed 40/4 offering, this does not make our decision regarding the Dataspeed 40/4 service offering an issue in that proceeding. We fail to see where bias will enter into the new

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7/ Memorandum Opinion and Order (FCC 76-1199), released January 5, 1977.

8/ Section 64.702(a)(5): "Hybrid service" is an offering of a service which combines Remote Access Data Processing and message switching to form a single integrated service.

Computer Inquiry as a result of our decision, or how our decision becomes arbitrary when we simply recognized the fact that it is subject to a rulemaking proceeding of general applicability. The tariffability of the Dataspeed 40/4 per se is not an issue in the new Computer Inquiry -- only the general issues it raises are to be considered.

10. CCIA's contention of irreparable injury in the absence of a stay is equally without merit. Its allegations of irreparable harm lack specificity and are speculative at best. The mere fact that unspecified companies will not receive an unspecified amount of revenues, as a result of increased competition by AT&T in marketing its Dataspeed 40/4 service, is not sufficient to establish irreparable harm. Arguments to the effect that the equities should at least favor the smaller competitors over AT&T are similarly without merit.

11. Moreover, CCIA has failed to show how the grant of a stay would serve the public interest. To the contrary, if a stay is granted customers would be denied access to the desired equipment. To the extent that there are customer benefits to be derived from the offering of the Dataspeed 40/4, we do not believe that it would be in the public interest to withold these benefits or that such action would be warranted even for a short duration. The public interest concerns which were addressed in the original Computer Inquiry, have not been thwarted by our Order, rather, our Order is in accord with those concerns and does not open the door for those abusive practices which we sought to prevent at that time. In view of CCIA's failure to make a strong showing that it is likely to prevail on the merits, its showing is insufficient to delay the benefits to the public that we see emanating from the availability of the Dataspeed 40/4 service.

12. In view of the foregoing and that fact that no compelling argument has been advance which would warrant a stay of our Order, we do not believe the public interest would be served by granting petitioner's motion.

13. Accordingly, IT IS ORDERED that the Motion for Stay in the above-captioned matter filed by the Computer and Communications Industry Association is hereby DENIED.

14. However, because of the pendency before the Court of Appeals for the Second Circuit of a Motion for Stay

of the Commission's Order, 9/ it is hereby ordered, sua sponte, that the effective date of the refiled tariff (Transmittal No. 12657) is extended for a period of 15 days or until the Court disposes of said motion, whichever occurs first.

FEDERAL COMMUNICATIONS COMMISSION

Vincent J. Mullins
Secretary

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[9] The Court presently has before it two petitions for review of our Order in this proceeding, one filed by IBM on January 4, 1977, and one filed by Computer and Communications Industry Association on January 17, 1977.

Memorex Corporation

San Tomas at Central Expressway
Santa Clara, California 95052
408/987 1000

Robert L. Erickson, Vice President-Legal
and Secretary

February 4, 1977

Computer & Communications
Industry Association
Suite 512
1500 Wilson Boulevard
Arlington, VA 22209

Attention: Mr. Terry G. Mahn, Attorney

Gentlemen:

We have received and reviewed your Transmittal No. 12349 relating to the Dataspeed 40 matter. This is to advise that Memorex does not concur with the filing of the Computer & Communications Industry Association in that matter. We regard the Dataspeed 40/4 offering as a communications service. Although we concur that rates charged by AT&T and its associated operating companies (hereinafter AT&T) for the Dataspeed 40/4 service should not be subsidized by revenues and profits from other communications common carrier offerings of AT&T, the Association should not indicate that its position in this matter in any way is representative of the opinion or position of Memorex Corporation.

Very truly yours,

Robert L. Erickson

Robert L. Erickson

jl

cc: (see attached list)

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